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ELEVATOR WORLD EUROPE

70th ANNIVERSARY

March - April
2023

Tower ONE at Frankfurt Outgrows Itself

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WOW

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Focus on Cabs and Design

Design, architecture and safety are touched on in this section.

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The Magazine of the International Building Transportation Industry

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The intelligent collection, management and distribution of information for the benefit of the industry, while providing a global marketing platform that expands the reach of the industry to all corners of the world.

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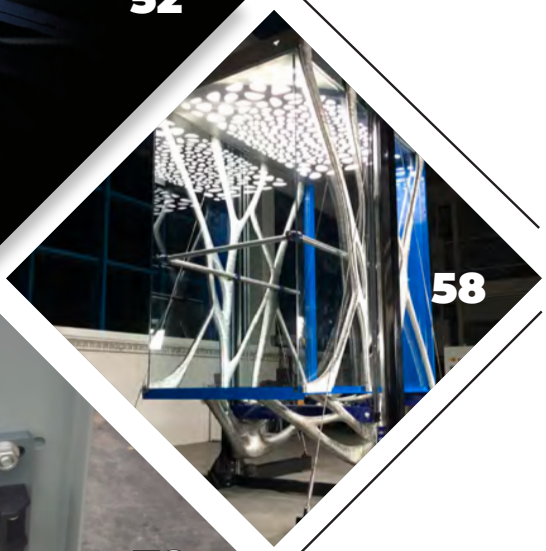

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EUROPE – GROWING BUT SLOWING?

by Ricia Sturgeon-Hendrick

Material shortages are decreasing in the EU building sector, but labor scarcity remains a challenge, according to banking and financial services company ING. This is very much the same story in the U.S. Within the building industry, elevator technicians are a profession; they are the fourth highest-paid people on a construction site, topped only by safety site managers, civil engineers and construction superintendents. The population in the EU is also aging, so training young technicians/engineers quickly is important to keep up with retirees.

Renovations are growing due to sustainability work, which, in turn, makes the sector less volatile. Therefore, only a modest decline is expected in 2023. The difference between sustainable buildings and green buildings is that sustainable buildings operate with all three sustainability pillars in mind (people, planet and profit), whereas green buildings focus solely on the environment. What does that mean? Buildings will have to be energy neutral, people friendly and function flexible. The future of the world we live in may well depend on how we build in the future. Let's face it, we are not going back to low-rise buildings that take up more land. We need the land to feed the world's growing population. So, we are clearly going up.

The war in Ukraine may slow construction briefly in 2023, but most signs point to continued growth. The European construction market value was about US$2624.17 billion in 2022 and is predicted to grow 4.9% by 2028.

This issue contains several fascinating interviews.

- ***"Is There Even More?"*** Author Undine Stricker-Berghoff speaks with Oliver Simmonds, principal engineer at Schindler, who talks about how 3-D printing will be used in the elevator industry.
- ***Meeting Demands, Rising to Challenges.*** Our Kaija Wilkinson talks with Andy Bierer, Otis Market Group Lead U.K. and Nordics and MD U.K., who states, "Who wins the war for talent will be a deciding factor for the future."
- Stricker-Berghoff talks with another Otis leader in ***"The Next Generation Secures Our Future Life."*** Udo Hoffmann, Central Europe Market Group lead and chair of Management Board of Otis Germany, talks about the service portfolio in Europe, digitalization, sustainability and how the future looks to him.

Our Focus Topic this issue, Cabs and Design, is highlighted in three articles:

- ***Sea and Sky*** by Wilkinson. On Camera in the W Barcelona Hotel in Spain highlights the elevators by FAIN Ascensores, a partner with Mitsubishi.

- ***A Mix of Old and New*** by Olivier Rouviére. The twin towers in La Defense, Paris, house an increasing number of bankers. Otis is handling the elevator modernization project in both fully occupied and functional office buildings.
- ***Vertical Transportation Awareness, Inclusiveness and Design Approach Matter in the Global Frame*** by Magdalena Krstanoski. This paper was first presented at the International Elevator & Escalator Symposium (IEES) in Barcelona, Spain.

Features this issue include:

- ***Tower ONE at Frankfurt Outgrows Itself*** by Stricker-Berghoff. Started in 2018, the ONE Tower was finished in July 2022 with 21 elevator systems from KONE, 10 powered by UltraRope.
- ***WOW*** by Olga Quintanilla Marful. TK Elevators provides accessibility to a new WOW Concept Shopping Center, transforming the old Hotel Roma in Madrid, Spain.

A number of papers from the 2022 IEES are in this book:

- ***Elevators and the Environment*** by Fernando Guillemi and Alea Guillemi. The authors examine how pollution by carbon dioxide and contamination by spills can be avoided.
- ***Analytical Method for Defining Requirements for Elevator Rescue*** by Hilkka Hämäläinen and Jaakko Kalliomäki. Analysis was needed to access the probability and severity of various rescue scenarios.

Many other articles and news items are in this issue, including a report on Iran's 12th International Seminar on Elevators and Escalators, where both elevator unions and universities were present.

We hope you enjoy this issue of ELEVATOR WORLD Europe. Let me know either way.

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CALENDAR

2023-2024

2023

APR 16-19	NAEC Spring Educational Conference Waikoloa, Hawaii, - USA naecconvention.com	
MAY 9-11	Expo Elevador São Paulo, Brazil expoelevador.com	
23-26	IAEC Forum 2023 Las Vegas, NV - USA iaec.org.com	
JUN 5-8	WEE Expo Shanghai, China elevator-expo.com	
7-9	Russian Elevator Week Moscow, Russia expo.vdnh.ru	
13-16	CECA 2023 Halifax Convention Halifax, Canada ceca-acea.org	
20-22	Elevcon Prague, Czech Republic elevcon.com	
AUG 22-24	Global Lift & Escalator Africa Johannesburg, South Africa gleexpo.com	
SEP 4-7	LiftCity Expo Jeddah 2023 Jeddah, Kingdom of Saudi Arabia liftcityexpo.com	

2023

SEP 10-13	NAEC 74th Annual Convention and Exposition	Reno, Nevada, ABD - U.S. naecconvention.com
20-21	Lift & Escalator Symposium	Northampton, U.K liftsymposium.org
OCT 17-20	Interlift 2023	Augsburg, Germany interlift.de
NOV 8-10	International Lift Expo Korea	Seoul, South Korea liftexpokorea.com
15-17	Global Elevator Exhibition	Milano, Italy geemilano.com
DEC 5-6	International Elevator & Escalator Symposium	Ediburgh, U.K elevatorsymposium.org

2024

MAY 9-11	Inelex 2024	Izmir, Türkiye inelex.com
22-25	Elevex Konya	Konya, Türkiye elevex.com.tr
SEP 16-18	The Elevator Show	Dubai, U.A.E elevatorshowdubai.com

Contracts

Orders received in Sweden, Germany and Canada.

The new Hagastaden station; image courtesy of the Stockholm Metro

KONE To Provide 17 VT Units to New Stockholm Metro Station

KONE has been selected by NCC Sweden, general contractor for the new Hagastaden station of Sweden's Stockholm Metro, to provide a range of PeopleFlow® solutions, including 17 vertical-transportation (VT) units. The order includes four MonoSpace® 700 DX elevators, two MiniSpaceTM DX inclined elevators and 11 TransitMasterTM escalators. Expected to reach completion by 2028, the Hagastaden station will serve a new, urban area with 6,000 new residences and 50,000 employers in Stockholm and Solna, just north of the city center. "Hagastaden, today the hub of the Stockholm region's life science cluster, will be developed to form a new urban district with housing, retail, culture and parks," KONE observed.

AKE Starts New Year With Largest-Yet Europe Order

AKE Aufzüge & Fahrtreppen GmbH, headquartered in Baesweiler, Germany, started 2023 with its largest single order in Europe to date, AKE Europe Managing Director Norman Rosnersky tells ELEVATOR WORLD. On January 3, the first working day of 2023, AKE learned it won a public tender for the supply, installation and maintenance of 14 heavy-duty lifts for a hospital in Oldenburg, Germany. The elevators will be equipped with the newest passenger-detection sensor technology. "This is a major step forward in our goals for 2023 and will see AKE complete an entire project with our own resources," Rosnersky said. "What a way to start the new year!"

Otis VT Package for Upcoming Mixed-Use Surrey Tower

Otis announced in January it is providing the VT package for City Centre 4 (CC4), a 23-story mixed-use tower with six levels of underground parking being developed by The Lark Group and ITC Group in Surrey, Canada. The package includes six SkyRise® and two Gen3TM elevators, as well as Otis' Compass® 360 destination-dispatch system. The structure was designed by WA Architects and is being built to LEED Gold certification standards. Canada ConstructConnect reported in December 2022 it will be part of eight developments that, when completed, will "make up the largest health and technology hub of its kind in Canada." Joining City Centre 1, 2 and 3, CC4 will boast 360,000-ft^2 of office space with more than 60,000 ft2 over five floors devoted to "wet lab" space — where chemicals, drugs or other material or biological matter are tested and analyzed requiring water, direct ventilation and specialized piped utilities.[1] Completion is anticipated in late 2025.

Reference

[1] wbdg.org/space-types/laboratory-wet

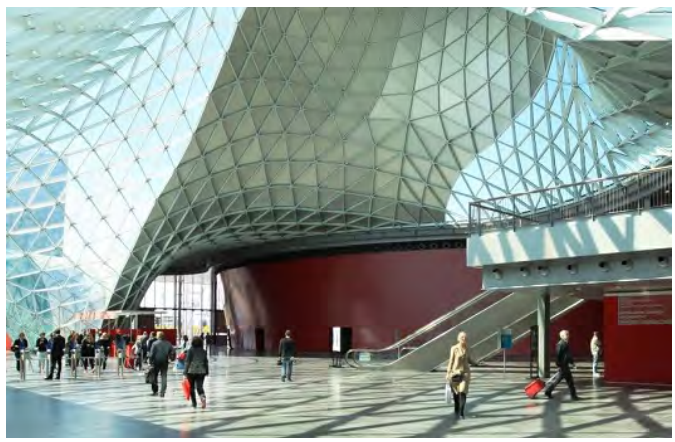
CC4; image courtesy of WA Architects

Events

Looking ahead to tradeshows in Germany and Italy

Interlift 2023 Expects More Joint Participation, First-Time Exhibitors

AFAG Messen, organizer of interlift 2023 on October 17-20 in Augsburg, Germany, expects more joint participation than in 2019, as well as several countries that will be represented in new forms and for the first time. In January, AFAG Messen had already received more than 300 registrations from 23 countries, 62% from outside Germany. The number of exhibitors is expected to increase "significantly" again when additional joint participations are secured in coming months. Reservations include 700 m^2 for a joint booth of the European Federation for Elevator Small and Medium-sized Enterprises and ANACAM (Italian National Association of Elevator Companies) and almost the same area for ANICA (Italian elevator components association). For the first time, interlift will see a joint representation of Indian vertical-transportation companies and representation from South Korea. Talks are also underway with the National Association of Elevator Contractors and the China Shippers Association. "China is very interested in presenting its products to the world again after the enforced break," AFAG Messen observed.



Inaugural GEE in Milan Spurs Strong Interest

The inaugural Global Elevator Exhibition (GEE), planned on November 15-17 at Feira Milano in Milan, Italy, is seeing strong interest, with at least 25 companies planning to participate as of January, organizers said. They include: Axel, Cast, Cmc Parklift, Donati, Fermator, Genemek, Gervall, Giovenzana International b.v., GMV, Hevos, Hydronic Lift, Inastria, KLEEMANN, Lift Trade Elevator, Liftech/Orona, Liftex, Lifting Italia, Mastech, Metalift, Millepiani Elevators, Monteferro, Moris, MP, N2S, Omarlift, Pfb, Prisma, Sicor, Sodimas, Tekno Sms, Telcal, TK Elevator and Vicini. Conference topics include energy efficiency, AI, the Internet of Things, safety design, equipment maintenance, market trends, the future of design and potential new markets. An incoming buyer program to facilitate business relationships between exhibitors and potential export customers is on the agenda. GEE organizers said:

"Born from the market for the market, GEE presents itself with an innovative and smart format with the aim of representing and promoting quality, safety and highest technical standards in a strongly international context in which Italy, the second country after China for exports, plays a decisive role in the world."

Hyundai

AI powers innovative solutions.

Hyundai Elevator Signs MOU for Advanced Passenger Safety System

Hyundai Elevator Co. has announced that it signed a memorandum of understanding (MOU) with LG Uplus for cooperation in developing and spreading the "MIRI-VIEW," the Korea IT Times reports. MIRI-VIEW is an intelligent safety system that analyzes passengers' movements and voices using image analysis and voice recognition technology, and when an emergency is detected in an elevator, AI notifies the customer center and elevator safety manager of the danger. MIRI-VIEW monitors sites with video and audio at the Hyundai Elevator Customer Care Center at the same time as reporting and can grasp the situation of passengers and respond promptly. Hyundai Elevator plans to start this service in June after operating a pilot project in the first half of 2023. Last year, the two companies established a worker safety system through joint development of smart safety equipment optimized for elevator installation sites. Do Ik-han, head of the Hyundai Elevator Service Business Division, said:

"MIRI-VIEW is a system that can protect the safety of passengers in commercial and public facilities where emergency situations may occur, such as residential facilities and nursing hospitals, where emergency response is required in the event of an emergency."

Lim Jang-hyuk (right), head of LG Uplus's corporate new business group, and Do Ik-han, head of Hyundai Elevator's service division (left), at the MOU signing ceremony; courtesy of Hyundai Elevator

Courtesy of CleanTechnica

Autonomous Robot Pilot Program Announced in South Korea

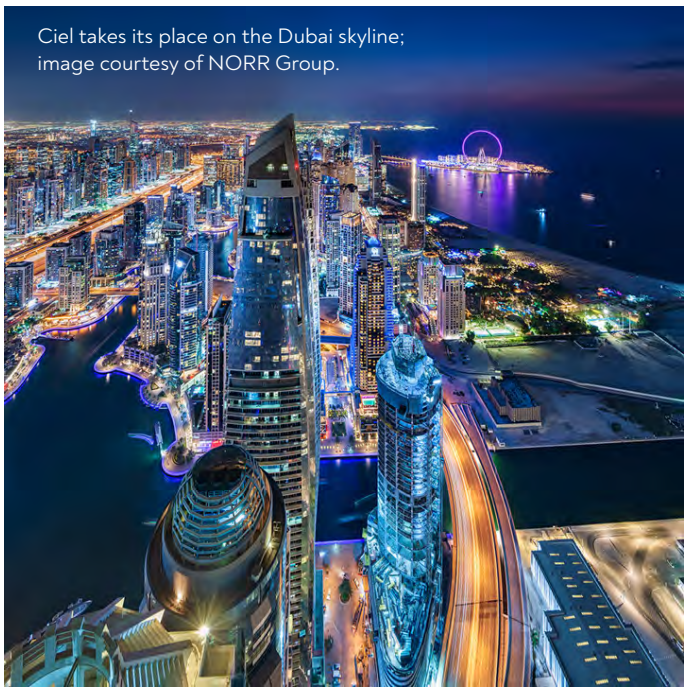
Hyundai has announced a robotic pilot program with autonomous delivery vehicles in Seoul, South Korea for last-mile deliveries, CleanTechnica reported in December. The program features Plug & Drive (PnD)-based robots that are being deployed at the Rolling Hills Hotel to deliver food, drinks and other goodies to guests' rooms between 8 and 10 p.m. Through AI and connectivity with the elevators, the robots can order the elevators up and down. They can also determine if the elevator is too full and wait for the next one, if needed. They can recognize customers with a type of deep-learning tech that is integrated into their computer brains. The customers use Kakao Talk, a messaging app that is popular in Korea, to place the orders, and then can track the delivery process in real time. In addition to the the hotel pilot program, the PnD-based robots are also being used in a mixed residential/commercial development for last-mile deliveries.

Dong Jin Hyun, head of Robotics LAB of Hyundai Motor Group, said:

"PnD-based delivery robots allow quicker delivery times with improved safety through the use of autonomous driving technology, including fast obstacle avoidance capabilities. We plan to keep upgrading mobility services, convenience, safety and affordability for customers through our pilot programs."

Jobs

Unique elevator and escalator projects in the Middle East and Europe



Ciel takes its place on the Dubai skyline; image courtesy of NORR Group.

Elevator bank in Ciel; image courtesy of NORR Group

20 TKE Elevators for World's Tallest Hotel in Dubai

TK Elevator (TKE) announced it provided 20 elevators, 15 of which are high speed, to Ciel, a 365-m-tall, 82-story tower designed by NORR Group that will become the tallest hotel tower in the world upon opening in 2024 in the Dubai Marina. Four of the elevators will move passengers at up to 8 m/s, making Ciel one of the few buildings in the Middle East to be served by such high-speed elevators. Ciel is being developed by the First Group's chief development partner, China Railway Construction Corporation, and will offer more than 1,000 guest rooms and suites, as well as an observation deck on the 76th floor with a 360-degree view, an infinity pool on level 76 and outdoor gardens in each ocean-facing atrium along the tower's height.

AKE, Del Bo Provide 12 Escalators for Naples Underground Metro

AKE Aufzüge & Fahrtreppen, headquartered in Baesweiler, Germany, and the Naples office of Italy's Ascensori Del Bo are partnering to provide 12 escalators to the Naples underground metro system. Scheduled for completion by the end of 2023, the project includes three AKE heavy-duty Model T units with a rise of more than 25 m. Designed for challenging public-transit applications, Model T has been supplied to public-transit systems in Istanbul, Ankara, and İzmir, Türkiye, and "is now on its way to conquering the European public-transit sector," AKE Europe Managing Director Norman Rosnersky said.

New & Emerging Technology

Elevators and robots, and a potential emergency solution

Hyundai Elevator Reports Interest in Open API

Hyundai Elevator has announced that it has more than 60 participants in its open application programming interface (open API) just one year after the company disclosed the interface to the public in March 2022, The Korea Times reported in February. The participants include major companies such as LG Electronics, Kakao, KT, LG Uplus and Woowa Brothers, as well as robotics firms, state-run research institutes and individuals, according to the source. Hyundai Elevator has been working on connecting its elevators with robots, enabling more than 30 buildings that have the company's elevators to use robots. Yongin Severance Hospital in Gyeonggi Province, South Korea, for example, has 10 medical service robots operated by LG Electronics, SK Telecom and robotics firm Twinny. Those robots can use elevators and transport blood, samples and medical kits. The hospital also has robots for child patients. A Hyundai Elevator official told the source:

"Our open API is based on cloud computing, so connecting with external devices such as robots and smartphones is available without additional equipment, if there is an internet connection."

A delivery robot uses an elevator; courtesy of Hyundai Elevator.

Pilot Program Uses EV Battery Power To Run Elevators

Japanese carmaker Nissan Motor Co. Ltd. and Hitachi Building Systems Co. Ltd., a Hitachi Ltd. Subsidiary, announced in January a plan to roll out a system to keep elevators running during blackouts by drawing power from the batteries of electric vehicles (EVs), Reuters reported. In what appears to be an early attempt in earthquake-prone Japan to make wider use of EV batteries, the companies are focused on keeping elevators running when the power supply is disrupted. During the pilot project, the firms said they kept an elevator with capacity for nine people running at a slow speed for 10 h by drawing power from the battery of a Sakura, a fully electric micro "kei" car made by Nissan. The V2X system uses the CHAdeMO charging standard supported by Nissan, a Hitachi Building Systems executive said. This allows it to also draw power from larger Nissan EVs, such as the Ariya and Leaf models. Hitachi hopes to start providing the system to apartment buildings in the financial year starting in April.

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Sally Loh

Perry Zheng

Key Appointments at Otis China and Otis World HQ

Otis recently announced Sally Loh as president of Otis China, reporting directly to Otis CEO and President Judy Marks. Loh succeeds Perry Zheng, who has returned to Otis world headquarters (HQ) in the newly created role of executive vice president, chief product, delivery and customer officer. Marks observed Loh's appointment marks an "exciting time in our parity journey, as she becomes the first female regional president in Otis' history." Marks continued:

"As president of Otis China, Sally will continue to evaluate and respond to market dynamics to ensure ongoing growth and development of our business through innovative product and service offerings while focusing on digital transformation across our service, new equipment field installation, manufacturing and enterprise operations."

Loh has been with Otis 23 years, working closely with Zheng for several years. Most recently, she was chief operating officer (COO), responsible for day-to-day operations of Otis China. Prior to her COO role, she was Otis China chief financial officer and held various other roles of increasing responsibility across Otis' Asia business. She holds a bachelor's degree in accounting from Nanyang Technological University in Singapore and an MBA from the University of Manchester in the U.K.

After nine years leading Otis China, Zheng assumed his new role in March. It entails leading product management, engineering, field operations, supply chain, operations strategy, sales and marketing with "focus, pace and competitive positioning." Otis said:

"[Zheng will] ensure we identify strategic programs with shared goals, objectives and accountability, while continuing to move our business forward with strategic vision and the tools and processes to best support our regions and customers."

Sylwia Raczynska

Raczynska Appointed Chief Transformation Officer at TKE

TK Elevator (TKE) announced the appointment of Sylwia Raczynska to chief transformation officer in February. She succeeds Jörg Ulrich, who is moving on to other opportunities. In her new role, Raczynska is responsible for TKE's broad transformation journey as a member of the senior leadership team, reporting directly to CEO Uday Yadav. Raczynska has 25 years' experience in the implementation of transformation programs in listed and privately held companies. Most recently, she was managing director at Alvarez & Marsal, a global professional services firm based in London. Prior to that, she worked in several renowned interim management firms in both Europe and the Middle East. Her focus was on implementing "stretch value creation" plans in Germany, Great Britain, the U.A.E. and Poland. Raczynska is a certified chartered accountant and holds a master's degree in economics from the University of Gdansk in Poland and an MBA in finance from the Kellogg School of Management in Chicago.

Pascal Nassour

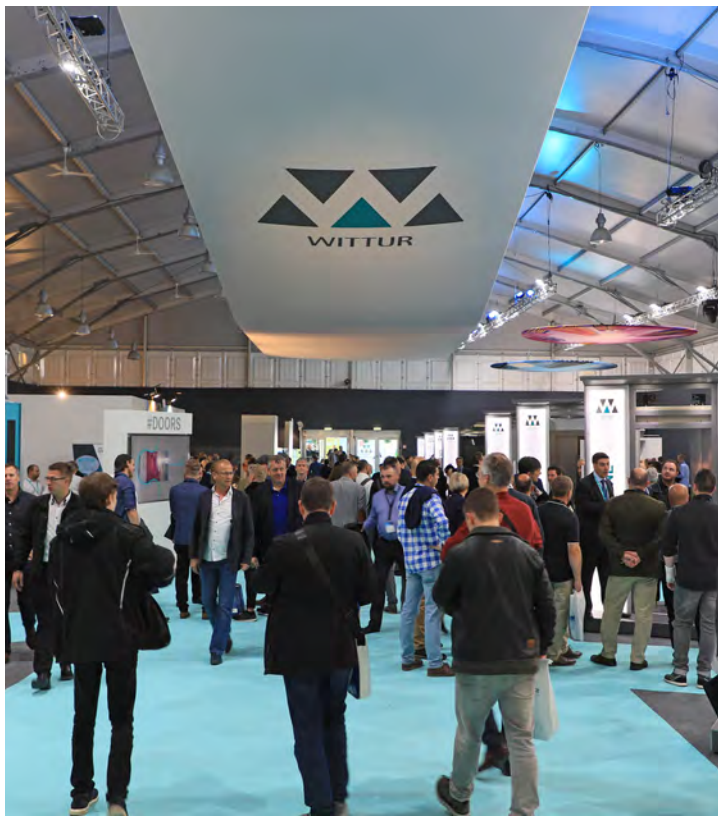
Nassour Named KONE MD for Kuwait, Oman and U.A.E.

Pascal Nassour, a vertical-transportation (VT) industry professional with more than 20 years' experience, has been named KONE managing director (MD) for Kuwait, Oman and U.A.E., Nassour announced on LinkedIn in February. Nassour thanked his previous team at KONE Qatar, Bahrain and Kazakhstan for their support over the past 10 years and said he looks forward to working with his new team. Nassour earned a bachelor's degree in telecommunications engineering from Sagesse University in Lebanon and began his VT career as a branch installation manager for TK Elevator in Abu Dhabi, U.A.E. He then joined KONE, holding various roles in Qatar over the years, including general manager, field operations manager and MD.

Ground Broken for Major Jakarta TOD That Includes Supertall

Officials from Taspen ANS, Mitsubishi Estate Co. Ltd. and the Japanese and Indonesian governments gathered in late January to formally break ground on the Green Energy Superblock Oasis Central Sudirman in Jakarta, Indonesia, KOMPAS TV was among outlets to report. Developed by Mitsubishi Estate on 3.3 ha of land owned by Taspen, the transit-oriented development (TOD) will include a 65-story, 276-m-tall tower and a 75-story, 331-m-tall supertall tower. Aimed at bringing "world-class business to the heart of Jakarta," the project — a strategic partnership between Indonesia and Japan — is close to various mass transit options. The 65-story tower will house condominiums, and the 75-story tower, offices, apartments, hotels and retail. Green Energy Superblock Oasis will be built over up to eight years to "world-class safety standards" that incorporate earthquake resistance. The property "will combine the interests of business and office activities through the concept of green building, which also puts forward the interests of environmental preservation," Secretary of the Coordinating Ministry for the Economy of Indonesia Susiwijono Moegiarso said.

Green Energy Superblock Oasis Central Sudirman; image © Mitsubishi Estate



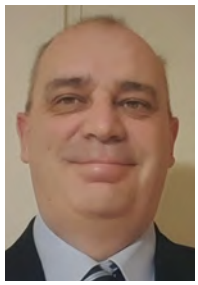
The Wittur CUBE from interlift 2019 saw record attendance; photo courtesy of Wittur.

Interlift 2023 Shaping Up To Return to 2019 Levels

Trade fair organizer AFAG Messen und Austellungen GmbH said in March that interlift 2023, planned on October 17-20 at Augsburg Trade Fair Centre in Augsburg, Germany, is shaping up to return to 2019 levels, with greater international participation than ever before. By March, more than 350 registrations had been received, and AFAG expects around 500 exhibitors to attend, filling all available halls. With international exhibitors from Italy, China and India, "there is a strong possibility that the high foreign share of 70% [in 2019] will be surpassed" this year. In March, Italy led participation at 16%, followed by Türkiye (14%), Spain (10%) and Switzerland and Austria (3% each). AFAG expected the order to shift soon, including a large joint participation of 40 Chinese companies. In terms of what will be new, there will be changed block divisions and walks in some halls. Wittur is also planning to "surprise" visitors with a new, 600-m^2 stand in Hall 2 "with a special focus on modernization and a new family of digital products."

Transitions

Personnel moves in Europe and North America



Luca Borgonovo

AKE Taps Borgonovo Italy Country Manager

AKE Aufzüge & Fahrtreppen GmbH, headquartered in Baesweiler, Germany, recently named Luca Borgonovo country manager for Italy. In addition to leading AKE's development in Italy, Borgonovo will contribute to elevator and escalator (E&E) code and standard development at the European Committee for Standardization (CEN) and International Organization for Standardization (ISO) levels. Prior to joining AKE, Borgonovo was director of business development and codes at SMI s.r.l., based in Lombardy, Italy. Prior to that, he held the role of global E&E Modernization Solutions director at KONE for nearly 13 years. Borgonovo studied aerospace, aeronautical and astronautical engineering at Polytechnic University of Milan and holds numerous licenses and certifications with entities including ISO, CEN and CENELEC.

Steven Freedman

Jan Giger

Two Key Transitions at CEDES for the New Year

Two key transitions occurred at Switzerland-headquartered sensor specialist CEDES AG at the beginning of the year: Steven Freedman transitioned from global head of hoistway innovations to group chief technology officer, and Jan Giger, most recently global head of access innovations, became lead for hoistway innovations. Giger also assumed the role of president of a new Elevator & Escalator business unit. Freedman has been employed with CEDES for more than 15 years. Prior to his hoistways role, he was president of CEDES' North American business, based in the greater Minneapolis-St. Paul area of Minnesota. Before joining CEDES, Freedman held leadership roles at Swiss chip fabrication specialist Espros Photonics Inc. and SICK AG, a Germany-based manufacturer of sensors and sensor solutions. Giger has been with CEDES for more than 19 years, starting as a design engineer. Since then, he has held leading roles in sales, product management and marketing. Both Freedman and Giger remain members of the CEDES management board.

Chris Smiley

Anant Bakshi

GUNN Consultants Announces New Hire, Promotion

Vertical-transportation (VT) consultancy GUNN Consultants, with offices in Calgary, Toronto and Vancouver, Canada, recently announced a new hire and a promotion. Chris Smiley joins the team as a VT consultant based in Toronto. He comes to GUNN with more than 18 years' VT industry experience, most recently at Schindler, where he held roles including field operations manager and business development manager over nearly six years. Prior to that, Smiley had a more than 12-year career at Otis, serving as a mechanic who transitioned to field supervisor. GUNN also recently promoted Anant "Andy" Bakshi from project manager to branch manager of the Calgary office. Bakshi joined GUNN shortly after graduating from the University of Calgary with a B.S. in engineering. He learned the ropes as a technical delivery coordinator, progressing to project engineer, then project manager, before being promoted to his current position.

Towers

Big plans unfold in Asia.

BIG Unveils Skyscrapers To Join Shenzhen "Green Belt" Development

Danish architecture studio Bjarke Ingels Group (BIG) has revealed the Qianhai Prisma Towers in Shenzhen, China, Dezeen reported in February. The pair of towers will be comprised of leaning volumes built on either side of the Shenzhen Hong Kong Plaza, a development designed by Japanese studio Sou Fujimoto, known as the "green belt." The skyscrapers will be 300-m and 250-m tall, with the taller containing apartments and the shorter, offices. Bjarke Ingels, founder and creative director of Big, said:

> *"Both towers are conceived as simple prismatic building envelopes split open to make room for public space on the ground where they stand. The open seams and gaping corners allow the green spaces to ascend from the ground to the sky leaving wedges for outdoor gardens and terraces for the life of the people living and working within."*

A pedestrian skybridge covered in greenery will cut through the lower levels of the office tower, connecting to the "green belt" of Shenzhen Hong Kong Plaza and providing shade for the public space below. In the interest of sustainability, photovoltaic cells will be integrated in the office tower's exterior and a double-skin, closed-cavity façade will be used to improve the building's thermal performance. Ventilation inlets in the residential tower will allow natural air flow. Rainwater collected via the sloped wall of both towers will be used to support the irrigation system and maintenance of green spaces. Global consulting firm Buro Happold will contribute traffic, sustainability and vertical-transportation expertise. Construction of the Qianhai Prisma Tower begins in 2025.

Qianhai Prisma Towers; image courtesy of BIG

A pedestrian skybridge cuts through lower levels of the office tower; image courtesy of BIG.

The gap between the leaning volumes leaves room for balconies and ground-floor public spaces; image courtesy of BIG.

15 and Counting

Schindler Spain recognized as Top Employers Spain for 15th consecutive year.

by Olga Quintanilla Marful, EW Europe Correspondent

Schindler Spain's commitment to people has once again become clear with the achievement of Top Employers Spain in recognition of its commitment to employees, the development and well-being of people, as well as the implementation of initiatives that promote integration labor and talent.

For yet another year, the Spanish subsidiary has placed people at the center of its activity, considering that they constitute the fundamental basis for the growth of an organization. "By caring for people, supporting diversity in its entirety, as well as providing equal opportunities, added value is created for the client," Schindler said.

This badge awarded by the Top Employers Institute to Schindler Spain is the result of various initiatives that the company has developed focused on achieving labor integration, as well as further promoting the well-being of its workforce.

In general, this business labor recognition recognizes excellence in practices that focus on people management and specifically on leadership, commitment, talent development, sustainability, ethics, diversity, integrity and inclusion of all social groups.

Within these innovative initiatives aimed at the social welfare of employees, Schindler highlights "Women Back to Business." This is a program consisting of providing a new job opportunity to those women who, after taking a break in their activity for whatever reason, can return to work. In this way, the company also increases female talent among its workforce.

Gemma Baz, director of Human Resources at Schindler Iberia, said:

"Having achieved this certification for the 15th consecutive year is a source of pride for the company. It is recognition of continuous work, and values the work carried out by the organization every day to listen and work tirelessly for the well-being of our employees. We are very pleased that Schindler continues to be one of the best companies to work for and create exceptional value for our customers."

For Baz, Schindler's greatest value is people:

"And, for this reason, we continue to work hard to promote initiatives for the professional and personal well-being of our employees, which directly results in the quality of our services to clients, a quality that characterizes Schindler. We have a series of initiatives identified with our employees that we hope to implement throughout the year to continue strengthening our commitment to them."

Schindler mentions that it has twice obtained the Top Employers Europe 2023 certification, taking into account that several of the European countries in which it operates have also been awarded.

This year, 118 companies in Spain achieved excellence in personnel management thanks to obtaining Top Employers Spain, which represents an increase of 9% compared to 2022. Their score is based on the HR Best Practices Survey in which candidate companies respond to 20 topics related to the best practices in human resources management.

According to David Plink, CEO of the Top Employers Institute, companies that acquire this certification persevere in their efforts to "continue to meet the challenges of an ever-changing world of work while working tirelessly to make a positive impact on the lives of their employees."

The sectors to which the award-winning companies belong correspond to the fields of health, technology, consumer goods, banking, pharmacy, energy and insurance. They usually have an average of 4,900 national employees and close to 95,000 globally spread over almost 60 countries.

Since the Top Employers Institute began 30 years ago, the program has registered a total of 2,053 Top Employers in 121 countries on five continents, which means a positive impact on 9.5 million employees around the world.

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Tower ONE at Frankfurt Outgrows Itself

The finished construction of ONE at Frankfurt am Main, Germany

The first high-rise building in Germany and Central Europe is now complete.

Access for pedestrians coming from the main street

Access routes and elevators are clearly signposted.

by Undine Stricker-Berghoff, EW Europe Correspondent
photos by Hans-Wilhelm Berghoff

When visiting the construction site in the summer of 2020, the ONE office and hotel tower in the Europe Quarter in Frankfurt am Main, Germany, had reached only 20 out of 49 planned floors, respectively ca. 190 m, as was reported in detail in ELEVATOR WORLD Europe in October 2020. The current images and additional explanations give an impression of the operation of the ONE Tower since summer 2022.

In October 2018, the cornerstone for ONE was laid. Only 28 months later, in April 2021, the building shell was finished. On schedule in July 2022, the skyscraper was finished completely. On June 30, the official final acceptance of the work was carried out by the public construction supervision. The installation of the entire building's services technology, such as cooling and heating, the fire alarm systems and all elevator systems, was carried out technically without objections; the systems are fully functional.

ONE is accessed via 21 elevator systems from KONE, 12 of which have direct dialing, an access control system with readers and software for controlling the elevators. The systems transport people and loads with a maximum lifting height of 189 m and speeds of up to 7 m/s (25.2 km/h). For the first time in Germany in ONE, 10 fast elevators to the upper floors are also powered by KONE UltraRope®. These belts, with a carbon fiber core

and plastic coating, replace traditional steel ropes.

The safety of people in the building during use is safeguarded. The first office tenants (co-working provider Spaces, Crédit Agricole Corporate and Investment Bank, consulting firm Baker Tilly, KROONGARD and Cloud Imperium Games) were able to move in after the formal acceptance. The 4-star superior nhow Hotel also opened to guests on August 1.

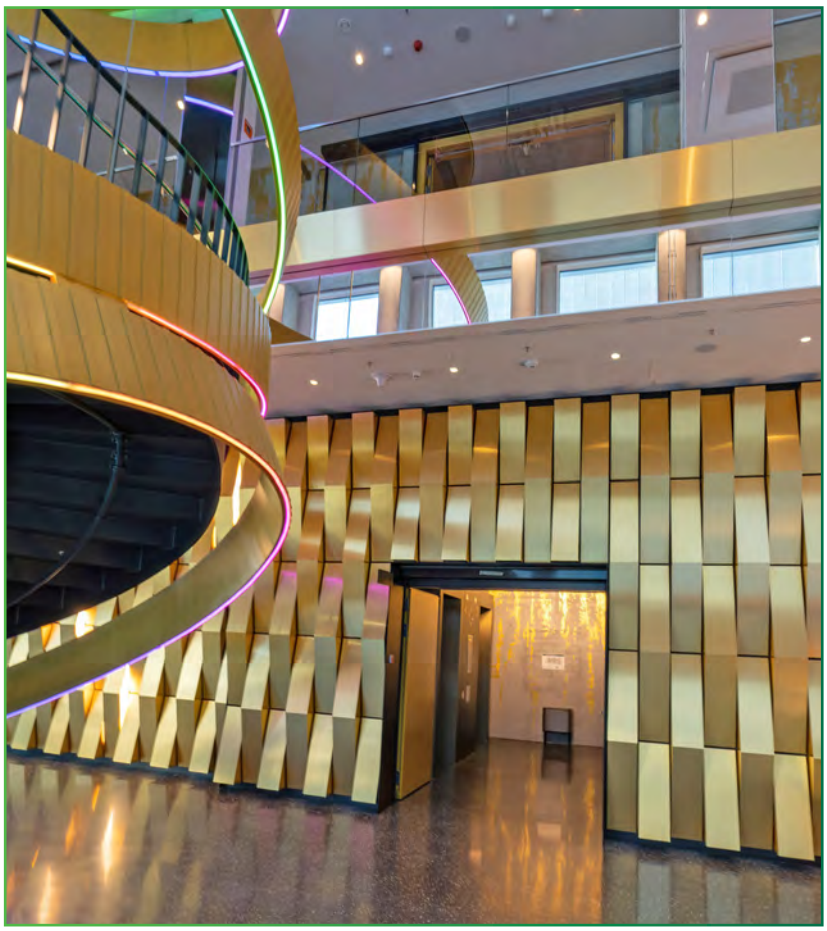
In July 2022, WiredScore awarded the building the SmartScore certificate in the highest category – platinum – as the first high-rise building in Germany and Central Europe. The project has already received the WiredScore platinum certificate for best connectivity and the platinum pre-certificate from the German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen DGNB).

In August 2022, ONE was nominated for the International High-Rise Award 2022/23. The tower, designed by Frankfurt architects Meurer Generalplaner, is one of only four in Europe – a total of 34 in the world – selected by the jury from approximately 1,000 applications.

On September 8, 2022, after four years of construction, CA Immo opened ONE with a ceremony attended by the Hessian Minister for Digital Strategy and Development Prof. Dr. Kristina Sinemus; Frankfurt City Councilor and Head of Planning, Housing and Sport Mike Josef; and around 300 guests. Sinemus emphasized:

> *"Digitalization shall contribute to solve our climate and sustainability problem. With the planning and construction of ONE, you have taken a decisive and important step in this direction."*

View into the shared lobby with 4.45-m headroom



View into the elevator lobby

Benchmarking Data for ONE

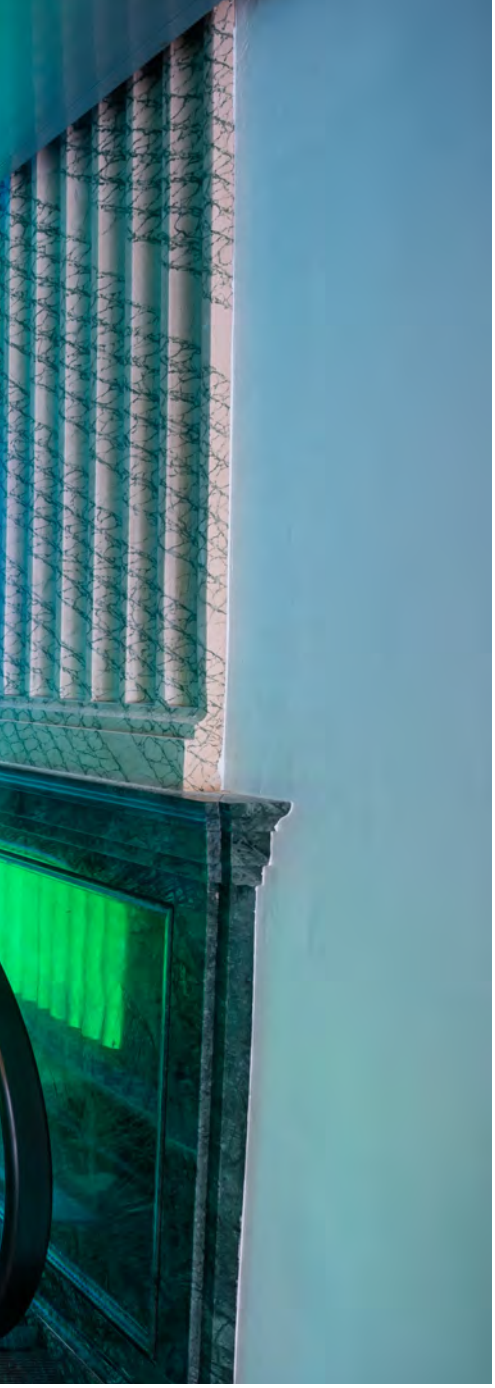
- **Height:** 190 m
- **Gross floor area:** 88.000 m²
- **Floors, including ground floor:** 49
- **Parking lots:** 472, including 25 e-charging stations
- **Bicycle storage spaces:** 600, 33 charging boxes for e-bikes
- **Offices: Floors** 22-46, including 7.100 m² co-working space
- **nhow Hotel:** Floors 1-14, 375 rooms
- **Skybar:** Public bar at 185 m with a wrap-around roof terrace
- **Elevators:** 21 KONE elevators, including four for hotel-use only, plus eight for office-use only with destination dialing control
- **Green Building:** DGNB-Certificate at Platinum level
- **Digital Excellence**
  - First high rise in Germany with WiredScore Platinum certification for best connectivity
  - First high rise in Central Europe with SmartScore Platinum certification for best digital user experience
  - Area-wide mobile communications coverage and network cabling
  - High-speed internet with fiber-optic connection
  - Optimized reliability through fully digitalized infrastructure
- **Total investment:** approximately EUR430 million
- **More information:** one-frankfurt.de

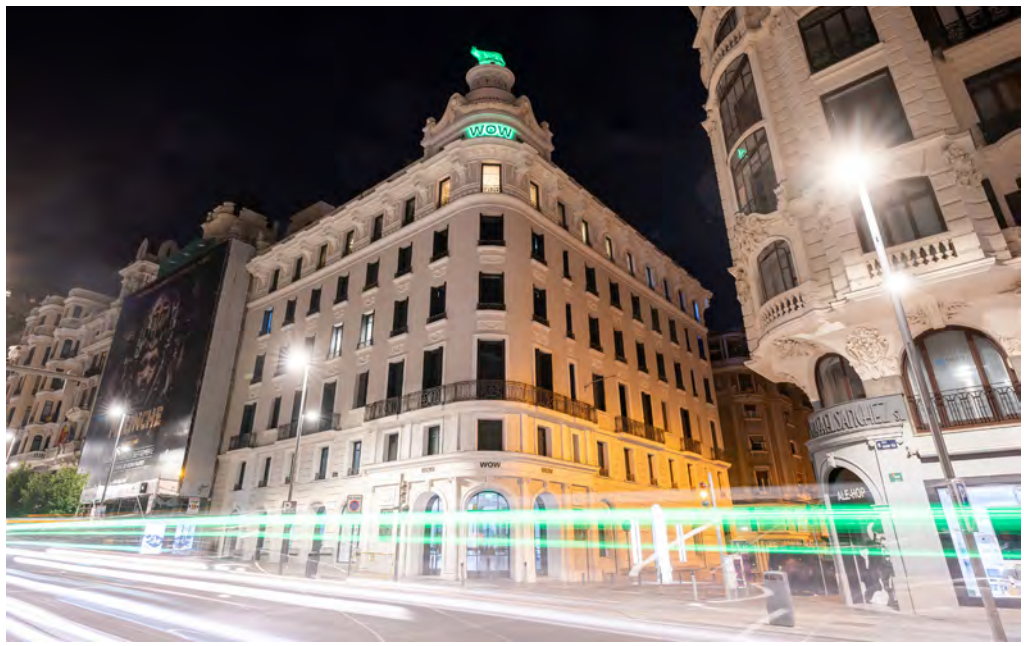
The stairs are characterized by an attractive design.

Ten velino escalators were installed for the project.

WOW

TKE PROVIDES INNOVATION AND ACCESSIBILITY FOR HISTORIC BUILDING-TURNED-SHOPPING CENTER.





The WOW Concept Shopping Center was inaugurated in March 2022.

Elevators from the TKE Synergy range

by Olga Quintanilla Marful, EW Europe Correspondent
photos courtesy of TKE

The Gran Vía in Madrid is gradually recovering its pre-pandemic splendor, and it does so with an air of modernity. The remodeling of an emblematic building merged with the innovation and accessibility delivered by TK Elevator (TKE) to transform the old Hotel Roma into the unique WOW Concept Shopping Center.

The German firm has installed a total of 15 elevators and escalators in what is considered one of the best shopping centers in Madrid. Located at 18 Gran Vía, this heritage building, built in 1913, boasts an area of 5,500 m^2 distributed across eight floors.

Prior to the renovation carried out by the Allende Arquitectos studio, the building housed the Justice Department of the Community of Madrid. With the extensive renovation, to which TKE contributed, the property has achieved LEED Gold certification, which implies the highest rating in terms of energy efficiency and sustainable design. The shopping complex, classified as futuristic, was inaugurated in March 2022 and offers visitors a sensory experience while shopping and enjoying the different restaurants and beauty services.

Of the 15 pieces of equipment installed, 10 are escalators of the velino XTRA 3 EK 35º 800HOR model, the installation of which was spectacular when carried out on the façade, as described by the TKE technicians.

A total of 15 escalators and elevators were installed by TKE.

TKE velino XTRA 3 EK 35º 800HOR escalators

The step width is 600 mm, the height of the balustrade is 1100 mm and they are prepared for MAX technology, the pioneering predictive maintenance system for elevators. This technological solution is powered by Microsoft Azure IoT technology, which significantly increases the availability and efficiency of the equipment.

"These accessibility solutions allow customers to enjoy their shopping experience and move safely and smoothly between the different spaces dedicated to fashion, beauty, decoration, as well as the two floors for restaurants," said TKE.

To guarantee accessibility to visitors of the shopping complex in terms of efficiency, TKE installed two passenger elevators, a freight elevator and two dumbwaiters in addition to the 10 escalators. The elevators belong to the Synergy range, models that satisfy the highest demands in comfort, flexibility and design. This equipment can support loads of up to 1000 kg with a speed of 1.75 m/s, has eight stops, double boarding at 180° and is also prepared for MAX technology.

The freight elevator is also from the Synergy range, with a capacity of 1000 kg, a speed of 1.75 m/s and six stops and also technically prepared for MAX technology. The two dumbwaiters serve the restaurant area.

The inauguration of the building had to be postponed due to COVID-19, which also affected the development of the work. "The duration of the work has taken longer than expected due to COVID and the complexity of the work to be carried out for multiple reasons," a TKE official told ELEVATOR WORLD Europe. The assembly began on April 5, 2021, with the freight elevator, and ended on March 28, 2022, with the delivery of the European Union Declaration of Conformity for the stairs, according to TKE.

Pedro Martín, general manager of TKE for Spain, Portugal and Africa, said:

"With this new facility, we reinforce our presence in relevant buildings in the city of Madrid. It is an innovative business concept to which we contributed with our extensive experience and excellent installation service. With our teams, the WOW Shopping Center has

The escalator step width is 600 mm, and the height of the balustrade is 1100 mm.

the best quality and assistance at their facilities. Participating in projects like this is exciting and helps us in our goal of continuing to grow to offer the best to our customers.

This shopping center is causing a great furor among customers and visitors since, as expressed by those responsible for WOW, it is an "extremely ambitious project because it wants to revolutionize the world of retail, which seems to be an innovative world, but deep down it is a very conservative world."

This unique complex exhibits a fresh and innovative design where the digital part has an important weight thanks to new technologies at the design, production and manufacturing levels. “Each floor of the building is planned to be a unique experience, which is related to the product that is sold. And, at the same time, it tells the visitor a different story.” In short, the WOW Shopping Center is a new way of buying and experiencing different sensations.

References

[1] esmadrid.com/en/shopping/wow

MORE ABOUT WOW

According to Madrid’s official tourism website,[1] WOW is a mega store designed as a multi-brand and multi-product commercial center in the heart of the Gran Via in Madrid. It offers a unique shopping experience at a digital and physical level. With 5,500 m^2 divided over eight floors, “WOW will have a temporary, rotating and, at times, exclusive range of fashion, decoration, technology, design and leisure, as well as technological leisure spaces, e-gaming, a cookery school, fitness and Instagramer studios, a digital museum and even a café where the waiter is a robot with an articulated arm,” the site continues. Brands range from traditional to innovative and emerging, with some even rising from going viral on the internet and social media. Each floor is said to offer its own unique experience with brands dedicated to the floor’s theme: “Tech Garage,” “Self-Care Lab,” “Home Boulevard” and so on. The top two floors are dedicated to gastronomy.

MIBA

Four events, including GEE, aimed at creating synergy in Milan

submitted by the Fiera Milano S.p.A. Press Office

Fiera Milano; photo courtesy of Massimiliamo & Doriana Fuksas

With a truly international scope, GEE aims to be a European meeting hub for the lift, escalator, moving walk and components sector that represents and promotes the highest quality, safety and technical standards.

The Milan International Building Alliance (MIBA) consists of four events to be held simultaneously at Fiera Milano in Milan, Italy, on November 15-18: Global Elevator Exhibition (GEE), ME-MADE Expo, SMART BUILDING EXPO and SICUREZZA. MIBA aims to "show the synergy between fundamental components of the design, construction and requalification of buildings" in light of European decarbonization targets — specifically, achieving a 55% reduction in greenhouse gas emissions by 2030. Data shows roughly 85% of buildings in Europe are more than 20 years old, and only a fraction have undergone major work to achieve energy consumption reduction of at least 60%. Further, half of Italy's 13.5 million buildings are older than 50 years. At the same time, the Italian construction sector, driven by tax incentives, is growing steadily, resulting in employment growth of 1.4% in the first three months of 2022. MIBA organizers said:

"This has opened up huge opportunities for all the markets involved, from design to materials, systems and technologies. As a matter of fact, these works would push the improvement of buildings to meet new regulations and achieve European objectives by reducing the impact on the planet and energy consumption in favor of a greater living comfort."

Turnover within the building industry is expected to become more significant in the next few years, and companies that are "true service providers" (of energy, health, safety and comfort) will have major opportunities. Recent estimates by Energy & Strategy — Politecnico de Milano, indicate that, by 2026, there will be total investments ranging from EUR10.7 billion to EUR21 billion affecting 110,000 to 230,000 buildings.

Added Value of an Alliance

With MIBA events, Fiera Milano offers an opportunity for companies to be part of an ongoing revolution and help grow markets around the world. Such events are key at a time when renewed attention is being paid to the role of the building industry as a facilitator of development, one that brings about concrete initiatives to spur the evolution of the building sector and its green and sustainable transformation.

MIBA welcomes the response of companies in the building sector to take part in a continuous innovation process where new solutions — from materials to plant engineering — are proposed. Adhering to high standards, the aim is to establish the building industry as "the central cell of the city, increasingly smart and sustainable."

The four concurrent events represent the various markets that will work together to realize more efficient buildings. They will provide a format through which industry players can discover proposals of highly qualified companies. MIBA's objective is to connect up to 1,000 companies with colleagues in the building sector.

MIBA Protagonists

The events that make up MIBA are "benchmark appointments for their respective sectors." They are:

- GEE, an event entirely dedicated to horizontal and vertical mobility that will be held from November 15-17. With a truly international scope, GEE aims to be a European meeting hub for the lift, escalator, moving walk and components sector that represents and promotes the highest quality, safety and technical standards. The event promises to be a showcase for "one of the sectors most sensitive to the ongoing changes and that is most interesting for urban renewal and mitigation of energy expenditures."
- ME-MADE expo, Italy's leading construction-industry event, that will be held from November 15-18. It will be a highly specialized and integrated platform with two exhibitions: Construction and Building Envelope, both revolving around the topics of innovation and sustainability, proposing to companies, buyers, professionals, technicians and operators advanced products, services and technologies to pave the way for the future of construction.
- SMART BUILDING EXPO, the home, building and automation/technology event organized by Fiera Milano and Pentastudio to be held on November 15-17. Against the backdrop of a fast-developing market in which buildings are always more automated, connected and able to multitask, it will include discussions about innovation with a focus on sustainable and smart solutions, where each building is considered a basic unit of a smart city.
- SICUREZZA, which is among the first events in Europe dedicated to security and fire protection. Planned on November 15-17, SICUREZZA will offer a comprehensive overview of video surveillance, access control, intrusion detection, firefighting systems and the new frontier of cybersecurity. Discussion topics will include digitalization, integrated systems and customized solutions, skills and professionalism.

Elevator Market Poised To Expand

Top trends boosting industry demand through 2027

submitted by Graphical Research

According to a recent study from market research firm Graphical Research, the global elevator market size is poised to expand at a substantial CAGR (compound annual growth rate) during the forecast period. In the aftermath of the COVID-19 pandemic, the global construction industry is expected to see a rising curve, facilitating the development of skyscrapers and high-rise buildings throughout the world. Robust urbanization is one of the crucial drivers of the elevator industry, with speedy industrialization being another key catalyst.

Elevators are primarily utilized across commercial and industrial facilities, as well as across mid-rise and high-rise residential buildings. While in residential buildings individuals use small home elevators for ascending or descending from floor to floor, elevators play a vital role in industrial units by transporting people and goods vertically across storage plants, production units and warehouses.

The following seven vital factors are certain to have a positive impact on the global elevator industry forecast through 2027:

Demand for Hydraulic and Pneumatic Elevators in North America

During the forecast timeline, the demand for hydraulic and pneumatic elevators is expected to remain aloft due to their suitability for low-rise applications. These elevators ensure cost efficiency as they require minimal upfront charges. When compared with traction elevators, this type of equipment demands lower maintenance costs, as well.

Due to the ability to transport larger weights, their adoption across industrial facilities and residential complexes has increased considerably over the last few years. The hydraulic and pneumatic elevator market share in North America is estimated to account for more than 30% of the total regional revenue through 2027.

North America Sees Consistent Deployment of MR Traction Elevators

North America is known to have a construction sector highly focused on and capable of developing skyscrapers and high-rise residential buildings. Machine-room (MR) traction elevators are quite suited to these structures, owing to their speed and the height covered. They perform better than hydraulic and pneumatic elevators across such buildings.

Consistent spending in the private sector to build mid- to high-rise structures will foster the North American MR traction elevators market. Reportedly, the private sector in North America was responsible for nearly US$1 trillion in construction spending during 2020.

Growing Residential Adoption in the Asia-Pacific

The Asia-Pacific (APAC) elevator industry outlook presents a thriving landscape thanks to the presence of a robust construction sector in the region. India, Japan, Indonesia, Malaysia, China and Singapore are set to contribute considerably to overall demand for these products. growth is most prominent across the residential sector of developing economies, due to the

> **In the aftermath of the COVID-19 pandemic, the global construction industry is expected to see a rising curve, facilitating the development of skyscrapers and high-rise buildings throughout the world.**

presence of favorable government policies that are focusing on residential infrastructure development.

With several new government projects aiming to provide affordable housing to the regional population, APAC elevator market share is anticipated to jump at a notable pace over the next six years. The market share from the residential construction segment is projected to observe a growth of more than 3.3% CAGR through the assessment timeline, supported by the upcoming smart city plans in the region.

Growing Burden of Maintenance and Repair Across Asia

Aging lifts and elevators entail considerable expenses for repair jobs and maintenance across Asian economies. New Zealand, Japan, Australia, Singapore and Hong Kong SAR, particularly, are witnessing a surge in demand for maintenance of older elevators. This is encouraging the commercial and residential sectors to adopt newer, advanced elevators that are efficient and require minimum maintenance.

Although the COVID-19 pandemic acted as a major disruptor for the APAC elevator market forecast, the emergence of new products is likely to generate fresh revenue. The construction sector is exhibiting considerable resilience despite the damaging blow. The region-wide COVID-19 vaccination drives are likely to enable further product manufacturing in Asia.

Overseas Contracted Projects Across China

China's elevator market size accounted for more than 70% of the total regional revenue during 2020 and might continue to retain its lead through 2027. The growing volume of infrastructure investments and the relaxation of real estate regulatory policies is driving the deployment of new lifts and elevators.

Owing to the rising number of overseas contracted projects across the nation, the APAC elevator industry is certain to flourish. As per the records of the Chinese Ministry of Commerce, in 2019, turnover of the nation's overseas contracted projects amounted to over 1192.75 billion yuan, increasing by 6.6% from the previous year.

Aftersales Services Across Developed European Nations

By 2027, Europe's elevator industry size is estimated to reach US$13 billion, triggered by the growing number of high-rise buildings across the region. New construction projects are incorporating new and advanced elevators and escalators across Germany, Russia, France, Spain and the U.K.

Although the matured construction market might hinder new product installation, the demand for aftersales, repair and maintenance is likely to rise across the more developed countries. The large number of migrants, coupled with the rising emphasis on sustainability, is driving European elevator market trends.

MRL Elevators in European Industrial Units

The industry share from machine room-less (MRL) traction elevators in Europe is expected to record a 2.3% CAGR through the coming years, fostered by their growing adoption across industrial facilities. Industrial buildings generally face space shortages. As these elevators lack a separate machine room, they require considerably less space than standard elevators. This makes them an ideal choice for industrial use.

MRL traction elevators can travel at up to 500 ft/min, covering more than 250 ft at a time. These elevators offer higher energy efficiency when compared with MR traction elevators, although their installation and maintenance costs are somewhat similar. Europe elevator market share is expected to gain traction due to the high reliability, low maintenance, less space requirements and improved energy efficiency of MRL elevators.

Graphical Research (powered by Global Market Insights) provides a large collection of market research and industry analysis reports covering many sectors across diverse regions like North America, Europe, Asia Pacific, Latin America and others. The comprehensive reports are aligned with the key industry trends and insights in specific regional markets.

A Mix of **Old and New**

Elevator modernization project in a fully occupied and functional office building in France

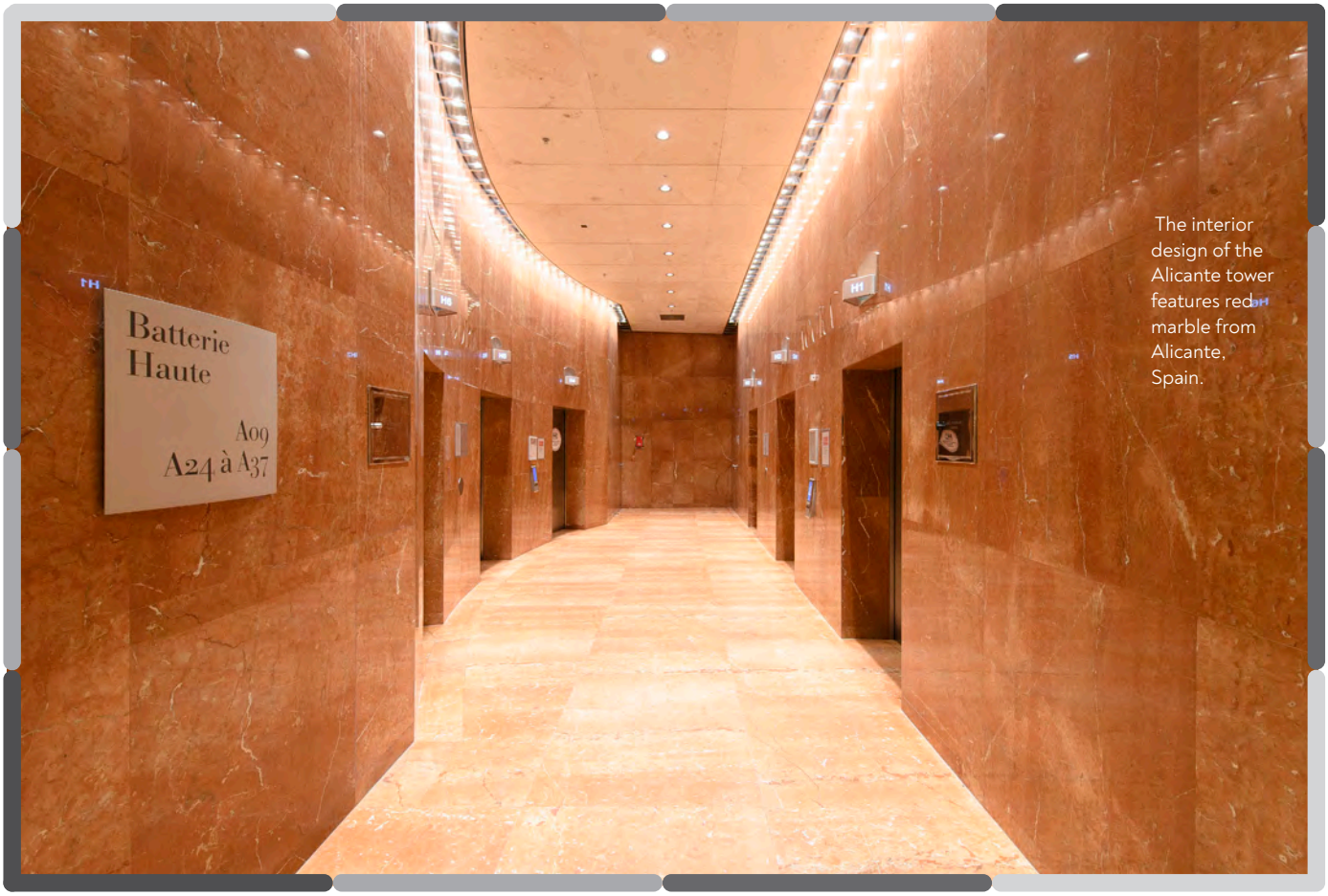
The Société Générale Towers in La Défense, Paris, France, were constructed in 1995.

by Olivier Rouvière

The Société Générale Towers in La Défense, Paris, France, were constructed in 1995 to meet the need of one of France's largest banking companies to bring its then approximately 5,400 employees — at the time scattered in about 50 different locations — into one site.

The building is comprised of twin office skyscrapers named Chassagne and Alicante. The towers are 36 and 37 floors, respectively, topping out at nearly 548 ft (167 m), and are separated by about 130 ft, connected at the base by a series of trading rooms in the heart of the building.

The towers are both beveled half-cylinders with sharply inclined roofs. While the buildings are symmetrical and their exteriors are identical, a major difference is in their interior design, which also gives



The interior design of the Alicante tower features red marble from Alicante, Spain.

them their names. The Chassagne tower uses a beige marble with stone from the French village of Chassagne, while Alicante is adorned with red marble from Alicante, Spain.

The original elevators in the Société Générale towers were installed by Otis, representing the largest new equipment project for Otis France at the time. It was a technical and technological feat with elevators that moved at speeds up to 6 m/s and a maximum rise above ground of over 160 m.

The global workplace has seen much change in the past 25-plus years. When Société Générale selected Otis to modernize the entire fleet of original Otis elevators in the building, they stated the objective of "designing future-ready mobility in the buildings."

The bank's new goal for the now 7,100 employees on-site was to move to a flex-office organization, where office space would be better and more fully utilized. The primary objective of the modernization was to increase the long-term performance of the elevator system and to optimize passenger traffic to reduce peak hour waiting times for the growing number of building occupants.

Otis overcame multiple challenges in carrying out this major modernization project. The most important among them was to perform the elevator modernization with minimal disruption to occupants, as the towers were still occupied during the entire work period. This meant operating both the original and the modernized elevators at the same time — technologies that were created more than 20 years apart. Otis crews also assembled elevator motors inside the machine rooms — a unique and important part of this project.

Started in 2018 and completed in January 2022, the modernization involved 55 elevators that were upgraded to Otis SkyRise® and Gen2® technologies. Otis also added its CompassPlus™ destination dispatch system, which was installed in advance of major modernization work to smooth the process and improve the passenger experience.

VT System Description

In new building construction, elevator and escalator integration is part of a comprehensive build with challenges resulting from coordinating work schedules, material delivery and the corresponding work and coordination with all other trades.

Modernization presents a different set of challenges in coordinating with owners, tenants,

The primary objective of the modernization was to increase the long-term performance of the elevator system and to optimize passenger traffic to reduce peak hour waiting times for the growing number of building occupants.

building occupants, visitors and other contractors. For the modernization of the Société Générale towers, this coordination was especially important because most of the vertical-transportation (VT) work had to be accomplished during the day, with as many as 4,500 people needing to be transported up and down every day.

The modernization was completed in two phases. Phase one consisted of deploying CompassPlus dispatching on the existing equipment. Phase two involved modernization operations in both towers simultaneously. Otis Regional Director Bruno Gabrych said:

> *"Being able to control the constraints of intervention in an occupied environment and a relentless priority to safety were our major strengths, as well as our know-how and experience in high-rise installation."*

The elevator system for the campus is composed of 55 elevators total. That includes 32 units (16 in each tower) for most passenger traffic and 23 elevators that serve parking areas, kitchens and storage, including eight freight elevators.

Otis conducted passenger flow studies to understand traffic in the towers and in the lobby that serves both towers. This provided the basis for planning modernization work with minimal passenger disruption and to determine the correct locations to position the CompassPlus touchscreens.

Within each tower, the 16 primary passenger elevators are distributed as a group of four serving the lower floors, a group of six for the middle floors and a group of six for the highest floors. To keep occupants moving efficiently throughout the building, one elevator unit from each group was taken out of service at a time for modernization, ensuring that the other elevators in the group were always available. This presented a technical challenge in developing a system for the original

Otis customized the CompassPlus displays for Société Générale so passengers could find their bearings easily.

The interior design of the Chassange tower features beige marble from Chassagne, France.

Elevonic 411 model lifts to work alongside the updated SkyRise or Gen2 elevators in the same group. Modernization Director Benoît Longuet explained:

> *"The major challenge in an occupied environment is to be able to maintain the service rate, in particular through the coexistence of old and new technologies, in order to avoid affecting passenger traffic. In short, we had to make technologies that are 20 years apart work together."*

This is where the first phase of the project — installing the CompassPlus destination dispatch solution — became so valuable. Not only would CompassPlus dispatching improve the performance of the elevators to mitigate the effects of taking one unit from each group out of service, but it would also allow for the operation of both the old and new elevators together.

In addition, Otis customized the CompassPlus displays for Société Générale so passengers could find their bearings easily. It was one component of an overarching communication campaign with building occupants to keep them informed of the project's progress and how to best navigate the building during modernization.

For the second phase of the project, among the 32 primary passenger elevators, those serving lower floors were upgraded to Otis Gen2 elevators with the Gen2 Mod solution, while the groups serving the mid-level and upper floors were modernized to Otis SkyRise high-rise elevators.

Otis' best-selling model with more than 1 million sold, the Gen2 elevator has been maximizing space savings and energy efficiency and providing exceptional performance with a smooth, quiet ride for more than 20 years. Gen2 Mod is a custom-made package of components and materials designed to meet the specific needs of existing buildings and upgrade to the latest Gen2 functionalities.

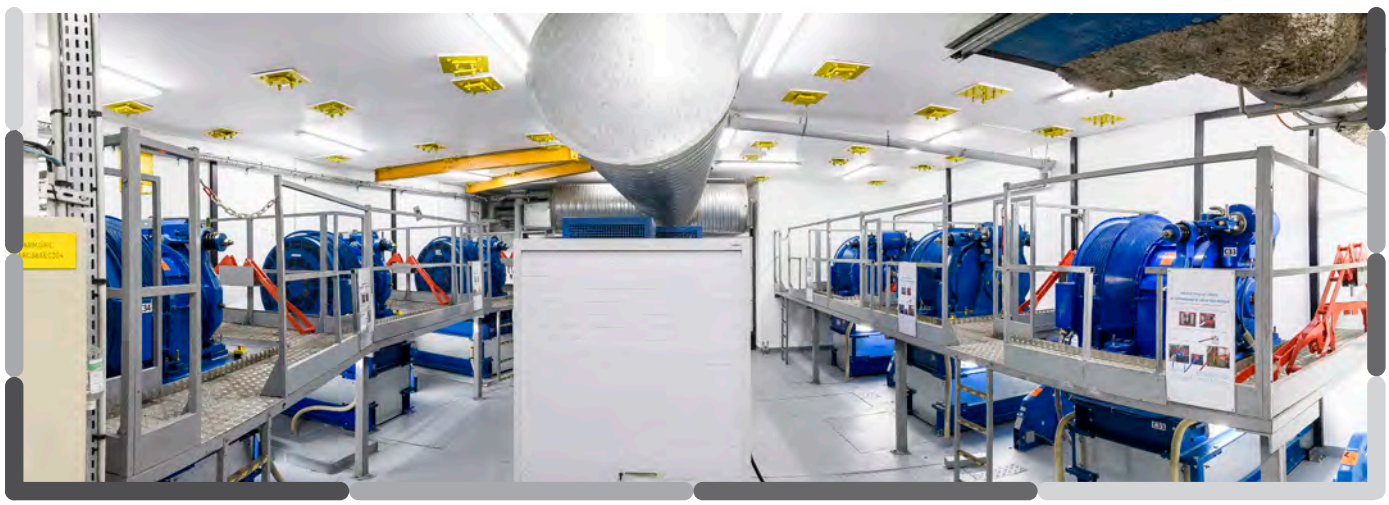
The SkyRise elevator is Otis' most advanced high-rise elevator with an efficient permanent-magnet machine and a state-of-the-art controller that

Lower bank machine room before

Lower bank machine room after

Lower bank machine room after

Upper bank machine room before



Upper bank machine room after

employs a patented motion-control algorithm to ensure a smooth ride. SkyRise technology is designed to meet the specific requirements of high-rise mobility in terms of travel speed and maximum rise.

Both Gen2 and SkyRise elevators come equipped with ReGen™ drives, which capture energy that would otherwise be lost and convert it to electricity that is fed back into the building's electrical grid, providing significant energy savings. For example, a Gen2 elevator machine with a ReGen drive uses 75% less energy than a conventional machine without a regenerative drive.

One unique component of this project was that the SkyRise elevator machines couldn't be delivered fully assembled to the machine rooms because of their size and weight. They had to be assembled on-site. Designed for new equipment projects, these machines are usually delivered to the machine room with a crane. For this modernization, the 24 4-T machines were brought up in pieces and assembled inside the narrow machine room. Thanks to the expertise of Otis technicians, the towers benefit from the SkyRise elevator, which is usually only available for new buildings.

In addition to the technical elements of the job, safety was a top concern while conducting the modernization in an occupied environment. The approach of modernizing one elevator at a time in each bank was made possible by the use of a "safety bridge." This Otis-patented technology was first used in France in 2010 and allows passengers to safely transfer from one car to another in the hoistway in the event of an emergency.

This solution is used in high-rise office buildings with "express areas," or floors without hall doors serving those hoistways because the cars don't stop there, to ensure fast and efficient journeys to the highest floors. Here's how it works: For a group of three elevators (A, B and C), while car B is being modernized, cars A and C can still operate safely thanks to the safety bridge, which allows passengers to move from car A to C if car A encounters an issue and stops during a ride. Once in car C, passengers can then be released safely to another floor. While in

place for safety reasons, there were no incidents during this modernization that required passengers to use the safety bridge.

For all these reasons, this modernization project is a flagship project for the company. Otis Director of Service Operations Stéphane Roussel said:

> *"This project is a benchmark for Otis due to the complexity of the installation and the use of our latest technologies in a building that absolutely could not suffer from traffic degradation. The Otis team came together to provide what has been recognized as an extraordinary achievement."*

In more than 30 years with Otis, **Olivier Rouvière** has never stopped progressing with leadership positions in field, production and management roles. After serving as a branch manager and then a regional manager in France, he was named general manager of Otis Switzerland in 2010. In 2017, Rouvière's duties expanded to include Belgium and Luxembourg. In January 2019, he returned to Paris to lead Otis France. His responsibilities were expanded to Belgium, The Netherlands and Luxembourg in 2022.

With iconic projects including the Eiffel Tower, the Grande Arche, several iconic buildings in Paris's La Défense business district and future public transportation stations around Paris, the Otis Western Europe portfolio includes sites that represent deep expertise.

For a number of years, Rouvière considered a career as a professional soccer player. Always a sports enthusiast, these days he runs, rides bikes in the mountains and skis regularly. His commitment and sense of teamwork reflect on his work at Otis. Rouvière trained as an engineer, graduating from INSA Lyon in microelectronics. He also holds a DEA in integrated electronics from the École Centrale de Lyon and completed an INSEAD Global Leadership Development program in 2014.

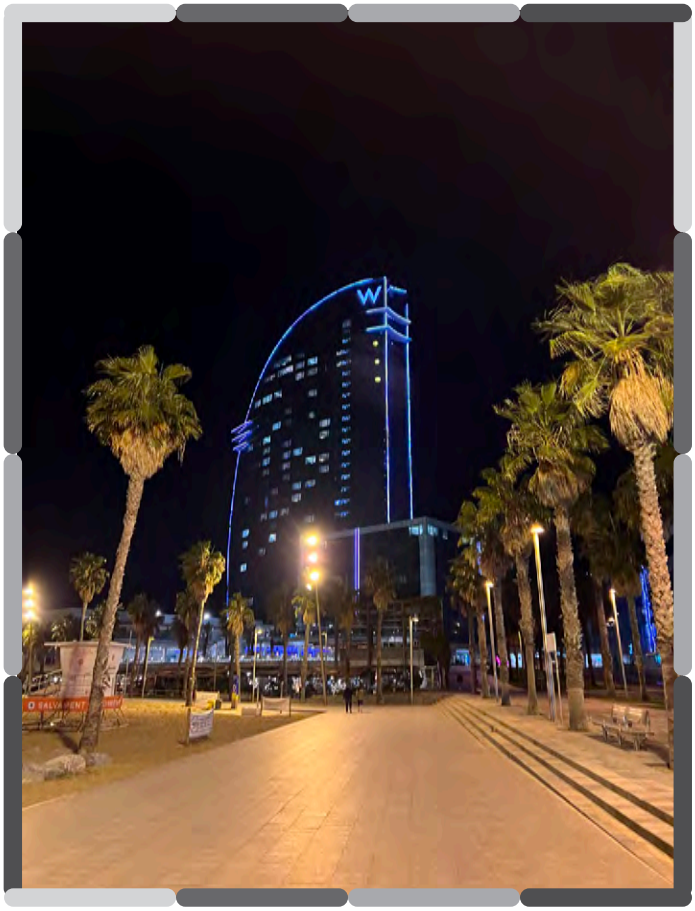
Sea and Sky

An up-close look at the elevator system serving the W Barcelona Hotel in Spain

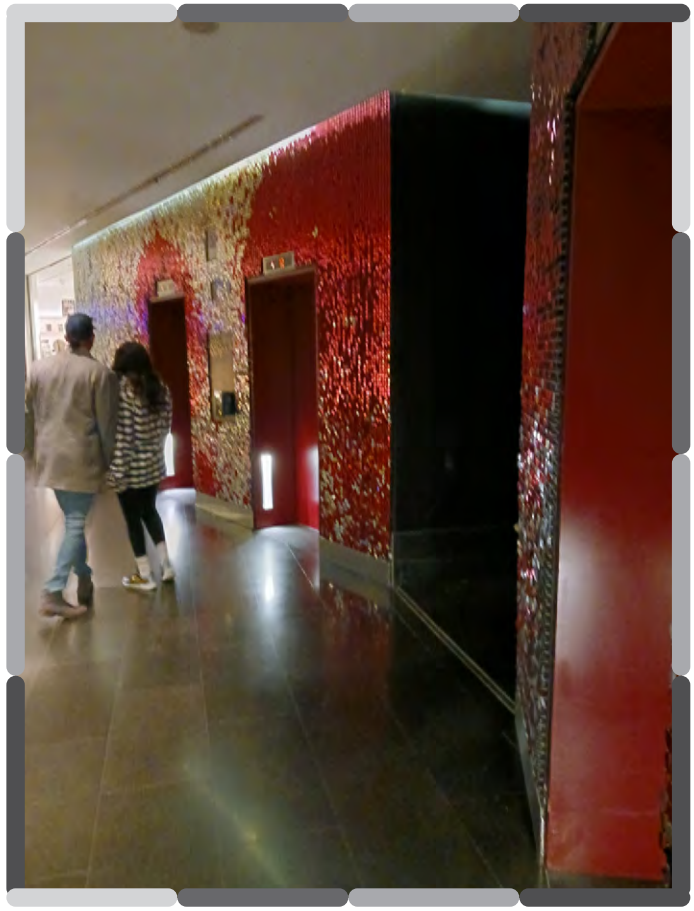
The W Barcelona, designed by renowned architect Roberto Bofill

by Kaija Wilkinson

Despite his employer, FAIN Ascensores, SA, providing all the latest GPS technology to pinpoint his routes, chances are elevator technician Carlos Alberto Balcazar had no trouble finding the W Barcelona Hotel, also known as the Hotel Vela (Sail Hotel), due to its distinct shape and prominent location in the Port of Barcelona. Designed by renowned architect Ricardo Bofill, the 98.8-m-tall, 28-story luxury hotel is in the city's Barceloneta District overlooking the Balearic Sea. Balcazar visited on a mid-December weekday in 2022 to service some of the elevators. Your author was also there, attending the International Elevator & Escalator Symposium (IEES). During her stay, she rode the elevators scores of times, admiring their comfort,



The W Barcelona lit up in neon at night



Bank of elevators in the W lobby

speed, stylish design and striking flourishes like the glittering, colorful elevator hall in the hotel lobby.

Both hallways and elevators are done in shades of browns and deep reds. The hallways and elevator bank on the eighth floor, where your author stayed, are resplendent in red from floor to ceiling and look down into a vast atrium. FAIN Ascensores has been maintaining the elevators on that floor (and all 19 units serving the hotel) for 14 years under a contract with Starwood Hotels & Resorts, part of Marriott International, Inc. W Barcelona opened on September 1, 2009. Its appearance and vibe, however, have a neon, 1980s feel — but not in a bad way.

FAIN tells ELEVATOR WORLD Bofill's original plan was for a sail-shaped tower rising 168 m, or roughly 50 stories. However, the city council "forced the architect to modify the project so as not to alter the silhouette of Barcelona, which was to be crowned by the two towers of the Olympic Village," FAIN states. The height was then brought down to 98.8 m so as not to steal the thunder of Mapfre Tower and Hotel Arts tower — the two tallest buildings in the city at 157 m each in Port Olímpic (Olympic Port), the maritime neighborhood of the Old City of Barcelona.

Although the W Barcelona is shimmery, beautiful and seems to rise from and reflect the sea, not everyone is happy with the landmark. It is still pointed out on some bicycle tours as an eyesore, speaking to the lingering reverberations of opponents who believe the tower alters sea and wind currents and is out of compliance with Spanish coastal law that prohibits building fewer than 100 m from the coast. The W is a mere 20 m from the sea. But now, it is there, generating tax dollars and employment — both directly and indirectly — for area residents. With a ballroom overlooking the beach, it proved an ideal venue for the 2022 IEES.

Relationship With Mitsubishi Electric Is Catalyst

FAIN Ascensores has been the exclusive distributor of Mitsubishi Electric high-speed elevators, ramps and escalators in Spain since 2001 when a commercial agreement was signed. The partnership led to FAIN carrying out other elevator projects for emblematic properties in Spain, such as the Iberdrola Tower 41-story office skyscraper in Bilbao designed by César

Looking out from the cab into a red hallway on the eighth floor

> "Mitsubishi and FAIN enjoy a very good image in the city thanks to the magnificent material provided by the Japanese company but also due to the monitoring of the construction and quality of subsequent maintenance."
>
> **— FAIN Ascensores**

Pelli and Torre Realia BCN and Hotel Porta Fira, 24- and 28-story towers, respectively, designed by Pritzker Prize-winning architect Toyo Ito for Realia in Barcelona's Granvia L'Hospitalet de Llobregat suburb. Both can be seen on the way to or from Josep Tarradellas Barcelona–El Prat Airport. These projects, as well as the W Barcelona, are served by 4 m/s Mitsubishi Electric elevators. The W project marked the first time for such high-speed elevators in Spain.

FAIN Ascensores says, in the case of the W Barcelona, FAIN's experience with Mitsubishi was key to being selected by a team that included Bofill and a construction joint venture consisting of Gerardo Alvira and Joan Casas of FCC and Agostino Sasso of OHL. FAIN says its goal was to provide "elevators operating according to the needs of the hotel chain, both for guests, cargo and other uses, with an innovative design and reliability." FAIN continues:

"In addition, it should be remembered that Barcelona has always been at the forefront of high-rise construction in Spain, with a multitude of office and hotel developments. For their part, Mitsubishi and FAIN enjoy a very good image in the city thanks to the magnificent material provided by the Japanese company but also due to the monitoring of the construction and quality of subsequent maintenance."

Elevator System of the Hotel

The elevator system at W Barcelona consists of:

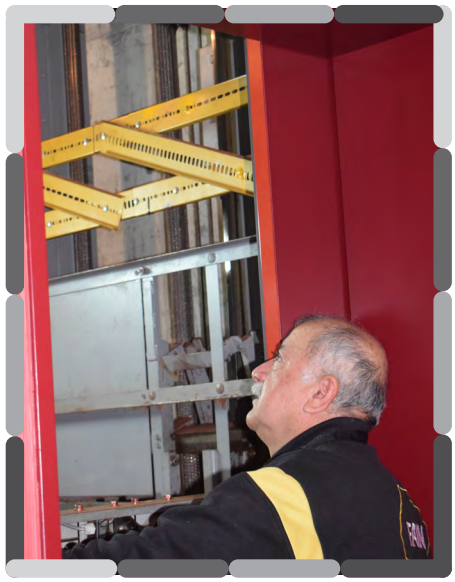
For guests:

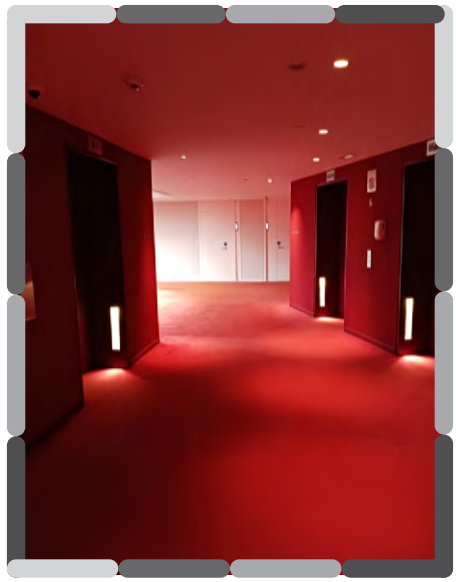
- Four NexWay high-speed elevators with 1050-kg capacity making 27 stops for the tower and the Hotel W skybar
- Two Elenessa elevators with 1050 capacity traveling at 1.75 m/s making eight stops for the lower areas of the hotel

For service and cargo:

- Two NexWay elevators with 1050-kg capacity traveling at 2.5 m/s making 29 stops
- One FAIN elevator with 1800-kg capacity traveling at 1.6 m/s making 29 stops
- One FAIN freight elevator with 2500-kg capacity making two stops
- For other uses:
- Two Elenessa elevators with 1050-kg capacity traveling at 1 m/s making two stops for the ballroom
- Two Elenessa elevators with 1275-kg capacity traveling at 1 m/s making three stops for the restaurant

Detail of the elevator bank in the lobby


FAIN Ascensores elevator technician Carlos Alberto Balcazar services a unit.


The elevator bank and hallway on the eighth floor are resplendent in red.

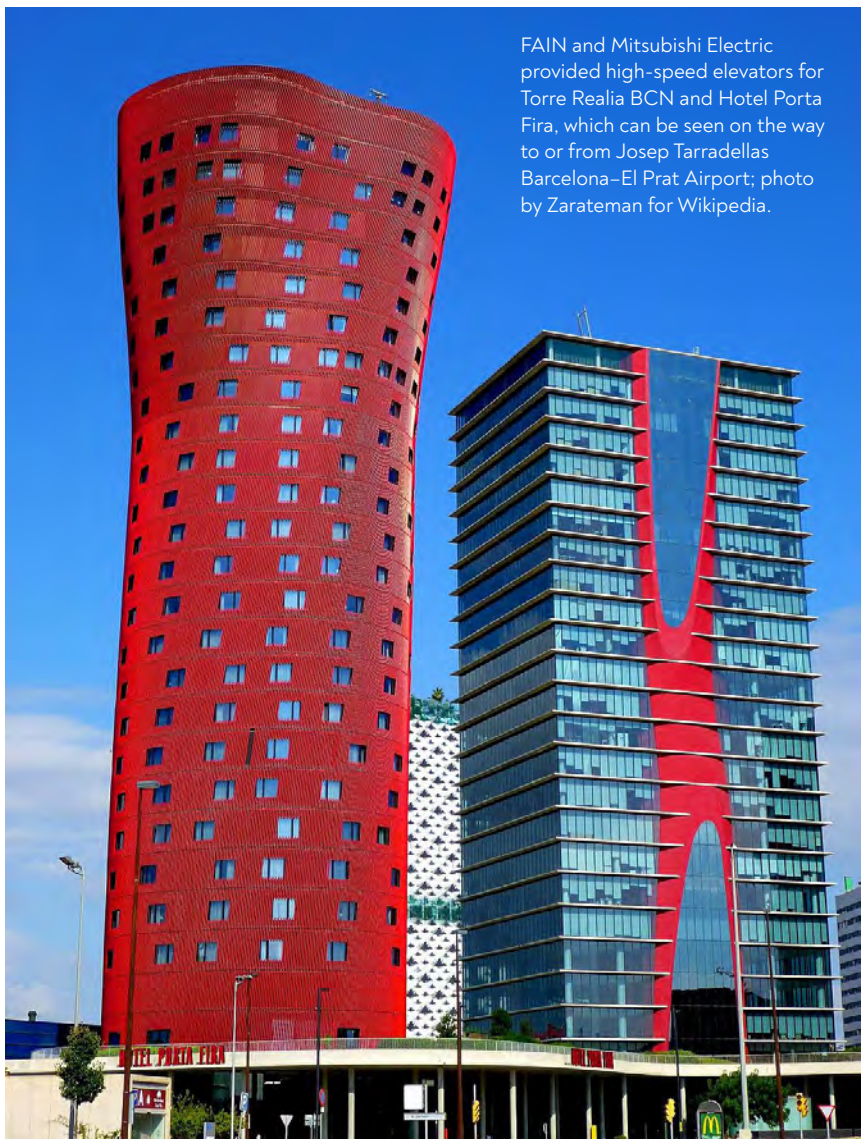
- Two Elenessa elevators with 1050-kg capacity traveling at 1 m/s making two stops for the kitchen
- One FAIN elevator with 630-kg capacity traveling at 1 m/s making two stops for the spa
- Two FAIN elevators with 630-kg capacity traveling at 1 m/s making four stops for the parking garage

Numerous Awards

Despite criticism, the W Barcelona has become a shimmering symbol of the city. FAIN tells EW it has received numerous awards in recent years, including Best Lifestyle Hotel at the national level at the World Travel Awards 2022, Best Luxury Hotel in Architecture and Design in Spain by the World Luxury Awards in 2019 and the Best Hotel Exterior Architecture designation at the Prix Villégiature Awards 2010. Meanwhile, its elevators keep chugging along 14 years later thanks to frequent, careful upkeep driven by the latest technology from FAIN. The units have not been modernized since the hotel opened, but redecorating is currently being considered, FAIN says.

Reference

[1] wikipedia.org/wiki/W_Barcelona


FAIN and Mitsubishi Electric provided high-speed elevators for Torre Realia BCN and Hotel Porta Fira, which can be seen on the way to or from Josep Tarradellas Barcelona–El Prat Airport; photo by Zarateman for Wikipedia.

This paper was presented at the International Elevator & Escalator Symposium 2022 in Barcelona, Spain.

Vertical Transportation Safety Awareness, Inclusiveness and Design Approach Matters in the Global Frame

by Magdalena Krstanoski

Abstract

By utilizing Multi Attribute Analysis, this paper identifies and outlines relevant factors in three fields - safety, inclusiveness and design strategies; in parallel, it emphasizes the importance of synergy in education, risk awareness, regulations and technology on a global scale. At the same time, it investigates factors that can suggest a path to achieve equilibrium among human dimension, the art of perception, cultural spatial relations, the economy and the future benefits of new technology that hold promise but also contribute to rising costs for measuring, managing, designing and implementing regulations. Safety is discussed from the perspective of all stakeholders, including the construction industry, taking into account consumer demand and utilization,

while a universal message remains for advocating the need for increased global safety awareness in the elevator industry, considering that education, training and safety measures need continuous improvement to reach a long-term solution.

Design is discussed from the end-user perspective. As the average lifespan of the population rises, consumer needs change to include the needs of people with disabilities; special-needs consumers ultimately affect the traditional design of conveying systems. Women were traditionally observed as family caregivers for the elderly and family members with disabilities. In this paper, they reveal another perspective, being the human element with the attributes in the decision-making process who can influence the characteristics of design and management aspects of a conveyance system.

The paper projects two universal messages: first is the need for unification and implementation of a safety protocol on a global scale, regardless of a country's economy; and second is the necessity of inclusiveness in the industry that will enhance the needs for change considering comprehensiveness and the consumer element, in an attractive and holistic way. All discussed elements, along with the factors that influence each possibility, are solutions for a sustainable future.

Introduction

Over the past two decades, the typical understanding of vertical transportation's (VT) basic function as a transportation device has changed. VT changed from a commodity to a specialized end-user experience package, particularly in office and mixed-use building developments. This not only represented owners' intent to obtain a design-driven and sustainable product application versus one with standard features, but it also reflected respective tenants' preferences and the market trend toward synergy between design, functionality and technology. From the technology side, this includes the facial-recognition feature in destination-dispatch applications, plus the security preference and personalized experience in the commercial segment, where restricted access is a priority and additional features are specified or requested. On the other hand, elevator design in residential buildings has changed very little when it comes to special considerations and front-end design personalization to reflect specific occupancy and users' interaction. During the pandemic, the residential sector, especially buildings around the world that are not Class A, experienced few changes and little care in comparison to commercial buildings' elevators and escalators.

At present, in the process of building planning, programming or schematic design, it is either by the owner's objective or designer's specific approach when strategies are introduced in building and VT planning, or it is an architect's initiative to accommodate the needs for people on the autism spectrum in correlation with the owner's intent or request. Currently, people on the autism spectrum are not addressed in the conveying systems' planning and building design strategy, but the general design concept has been applied based on building type, occupancy type, specific design criteria and traffic analysis related to building use, project drawings and specifications.

It is more comfortable to initiate new elements that will address socio-cognitive aspects when project objectives are met in new construction rather than in modernization. In existing construction, designers need to accommodate already-built space. On the modernization side, as many elevators are reaching lifecycle curve entering remodeling, typical modernization in most cases includes hoist machine motor replacement; replacement of elevator wiring and car fixtures; door tracks; hoisting cables; brake; cab design; hoistway fixtures; and, depending on the specifications, technology to enhance the travel experience in high-rise office buildings. However, socio-cognitive aspects are not on the priority list.

One of the most challenging tasks of the designer is overbridging the commonality of the minimum required by code regulations, specifying and creating a living responsive structure and VT to satisfy the flow requirements, creating an inviting space to accommodate the occupancy needs via spatial configuration, colors, finishes and introducing natural light and considering temperature, all characteristics that do not specifically include people with autism spectrum disorder (ASD).

Disability, Autism and Design

Children and adults with autism and ASD are facing complex challenges with social interaction; communication; expression; imagination; demonstrating repetitive behavior and preoccupation; sensitivities to certain colors, shapes, textures, sound and change of routine; excessive focus on parts and sometimes details; visual perception; movement repetition; and sensory preoccupation. There are more detailed and explained borders of behaviors, sensitivities and possible reactions noted in various literature and by observation.

ASD's prominence in society today makes it necessary to address this subject more.

A study published in JRTDD (Journal for ReAttach Therapy and Developmental Diversities, Special Education Research, 2019 September 08) discusses methodology employed via interviews and questionnaires conducted on a limited number of ASD-related participants, leading to various thematic information results. Participants (86.73%) cited anxiety as

a frequent challenge. In the same study, results show music therapy (7%) and sensory stimulation (5%), using various lights and equipment, have been identified as two of several measures and approaches to overcome anxiety (Vasilevska Petrovska, I., et al., 2019).

If we reflect on the pandemic, many individuals not on the autism spectrum experienced anxiety. For the first time in recent times, the general population was affected in a way similar to people with ASD, and we learned to better relate to those with this and other conditions.

Man's evolution has been characterized by the development of "distance receptors" (Hall E., 1966). Distance receptors, along with space and sensory characteristics, became more important than ever in the past year of the pandemic as we learned to have more empathy.

Hall is fascinated by renowned American architect Frank Lloyd Wright's ability to translate space and texture, as well as his material selection and transitions. Wright is the designer of thousands of structures, among which is the famous Guggenheim Museum in New York City. The Guggenheim has open central space, unique architecture in its interior and a spiral ramp leading to its upper floors that almost feels like it is reaching the sky. If trying to find relation with this structure and the topic of this paper with music, the lyrics of two songs come to mind. The first are those from "Somewhere Over the Rainbow," sung by Judy Garland in the 1939 classic movie "The Wizard of Oz," which was adapted from the children's book by L. Frank Baum first published in 1900. The music is by American composer Harold Arlen with lyrics from Yip Harburg. The song's opening lyrics are:

"Somewhere over the rainbow, way up high
There's a land that I heard of, once in a lullaby
Somewhere over the rainbow, skies are blue
And the dreams that you dare to dream, really do come true

"Someday I'll wish upon a star
And wake up where the clouds are far behind me
Where trouble melts like lemon drops away above the chimney tops
That's where you'll find me"

The second song is titled "Human Behaviour" by Icelandic recording artist Björk from her 1993 album, "Debut." The lyrics begin:

"If you ever get close to a human, and human behavior
Be ready, be ready to get confused..."

Per the National Center for Educational Statistics (NCES) in 2019/2020, approximately 803,000 individuals ages 3-21 with autism were covered by the Individuals with Disabilities Education Act (IDEA). This is an increase from previous years: in 2018/2019, approximately 762,000 were covered by the IDEA; in 2017/2018, approximately 710,000 were covered; in 2016/2017, approximately 661,000. In 2000/2001, approximately 94,000 were covered (NCES, February 28, 2021).

Per the Centers for Disease Control and Prevention (CDC), based on research conducted across 11 communities/states, one in 54 children aged 8 years in 2016 show ASD prevalence, calculated as the number of children with ASD per 1,000 children aged 8 years in the defined population or subgroup (CDC, 2020). This is an increase from 2014 statistics of 11 communities, showing one in 59 children aged 8 years identified on the autism spectrum (CDC, April 27, 2017).

Per Autism Europe, ASD affects approximately one in 100 people. This is approximately 5 million people on the autism spectrum in the European Union alone, not including other non-Union members (Autism Europe, About Autism Section, 2021).

People with ASD face many challenges. The sixth sense, the vestibular sense, has been demonstrated as a challenge that can sometimes lead to fear or avoidance of certain activities, such as swinging on swings, descending on elevators or walking uphill (Trajkovski, V., 2020). There have been observed or noted obsessions with elevators, including riding on elevators; fear of exiting tasks that relate to movement; running full-speed uphill, running to climb to the highest spot on the shelf; and the excitement of reaching the top of the hill while running fast.

As no two ASD cases are the same with each expressing different proprioception characteristics, the seventh sense (body position, perception and sense of movement in the space and spatial orientation as a result of the muscle and joints) may result in difficulties with handling small objects, and small elements, or the opposite in being fascinated by the same (ex.: putting together a complex puzzle becomes a task and needs to be successfully resolved).

Other sensitivity areas include auditory (reaction to sound, distraction by sound and background noises, fear of certain sounds); tactile (reaction to temperature, pain, texture); visual (reaction and sensitivity to light and color, likes or dislikes of bright light and colors); and olfactory (taste, reacting to sense of smell, over perceptible or non-perceptible on certain scents and aroma).

Regarding color, certain conditions may create a hyperactive state. In a colorful environment, different types of light create different sensitivity reactions, such as LED versus reflective light. Applying yellow foil to assist with reading and visual processing has been found beneficial (Trajkovski, V. 2020).

As Hall refers to the problem in 1966 as designing and rebuilding cities with an understanding of the needs of a large number of people (Hall, E., 1966), today, 55 years later, the same challenge appears.

One of the most involved steps in the process of VT is to envision the traffic pattern and functionality based on the building occupants. In most cases, we look at conventional characteristics: building type, occupancy type, cultural aspects of the geography, traffic patterns, etc., when we design the conveying system. Accommodating the autistic population in building planning, VT and elevator car design (at times referred to as a small, uncomfortable and even frightening space) is still to be addressed, along with implementing methods to improve the quality of life of people on the autism spectrum and people with disabilities (ex. disabilities not addressed in Southeast Europe, and accessibility in elevators in existing buildings remains an obstacle for people with mobility challenges). Designing VT for individuals with ASD has often or usually been ignored. At present, there is a lack of regulations to ensure designing spaces and elevators that correspond to humans with ASD. For example, no requirements address specific light in the car (or elevator hall lobby); color and texture of the walls; sound in the car; and the larger personal space that may be needed for autism accommodation.

How can an elevator recognize the need to adapt its inviting space to a passenger with ASD? Should this concept address more residential elevators than commercial building elevators, or is there an equal need across all types?

Autism Europe estimates that less than 10% of people on the autism spectrum across the EU, not including non-Union members, are employed. (Autism Europe, PR: Autism-Europe calls on the EU to better develop access to education and employment Section, 2021).

Elevator design that takes into account the needs of people on the autism spectrum can be more of a subject of interest as the population of people on the spectrum continues to rise at an alarming rate. This needs another look, not only for elevators in residential buildings but elevators in office buildings, as well.

Another consideration should be ways to change car wall interior color and texture. Perhaps this change could be similar to creating a mood with soft, glowing lights that create a relaxing atmosphere in any environment; they get activated after recognizing the passengers' needs upon their entering the car or calling the hall button, or in the operating car panel. Adding features that can trigger changes in ceiling car light intensity and temperature can make the interior more inviting once passengers on the ASD enter the space. Introducing elevator music that calms anxiety can contribute to the passengers' riding experience. Covering elevator buttons with yellow foil can enhance the visual processing without affecting the need of

people with visual impairment (for example, do this where ADA is applicable to maintain code compliance; otherwise, in other areas where ADA is not applicable, introduce a similar feature for people with visual impairment). The importance of sustainably tailored material, introducing illumination and features are of importance to implement and compliment end-users' needs and the subject's specific meaning, functionality and purpose, while balancing with the manufacturer's objectives, guidelines, processes and introducing cost-effective solutions.

Women are traditionally observed as family caregivers for the elderly, people with disabilities and mostly involved with their children with ASD from the family side. Their input, which included varieties of experiences their children with ASD have, such as sensitivities, reactions and attributes in search for answers, can help researchers understand the complexity of the autism spectrum. This feedback can assist in the decision-making design aspect and characteristics of the success of the application.

Designers, along with the end-users, are facing a lot of challenges in influencing decision makers to introduce new elements for inclusiveness of those with ASD and other disabilities, as well as increasing accessibility. Everyone will benefit from the learning process, creativity, innovation and flexibility. At present, there is still a lack of regulatory accessibility implementation around the world to accommodate the aging population and disabled.

Safety Perspective

When we discuss safety applications related to elevators, the first aspect that comes to mind is maintaining, achieving and exceeding safety on the jobsite during construction. The majority of this is driven by jobsite safety initiatives and regulations. A variety of factors affect this: technological changes that introduce new hazards on the jobsite; regulations; productivity demand; labor unions and labor organizations; regulatory agencies; insurance rates in correlation with accident rates; professional ethics and managing construction safety. Maintaining health on jobsites has been even more challenging for construction professionals over the past decade, but, at the same time, working conditions have improved for employees in recent years.

In the U.S., The Williams-Steiger Act, Occupational Safety and Health Act of 1970, states every employee is entitled to a safe and healthy workplace, free of recognized hazards. 29 CFR 1926 is the comprehensive safety and health standard that regulates the construction industry. In some respects, in a similar fashion, the European Agency for Safety and Health at Work introduces European Labor Authority and presents European OSHA for EU members. Other non-EU members adopted and/or introduced safety regulations based on country preference and type of work.

The impact and expense of workplace injuries and illnesses can be categorized as direct and indirect costs, including many factors and related damages to employee, property and equipment, creating direct and indirect consequences. Direct and corresponding damages can include injury or loss of employee's life; affected family members; affected coworkers (some feeling it could have been them); litigation; loss of production; wage loss; loss of morale; loss of motivation; increased insurance rates; and the cost to train to replace the injured or affected employee. The overall cost of work-related injuries in the U.S. in 2019 was $171 billion. These costs include lost wages, medical expenses, administrative expenses, fire-related losses, injury investigation time and damage to properties in work-related injuries (National Safety Council (NSC), Work Injury Cost Section, 2021).

Based on the available data related to conveying systems between 2019 and 2020 (OSHA, Accident Search, Section) in the U.S., some of the fatal accidents happened in the following categories (this does not exclude other accidents and probable causes of accidents, but lists some):

- Working on new installation in the elevator shaft, one employee standing on the top of the car, coworker in the basement of the shaft, struck by falling object
- Working in shaft servicing lights, elevator car descending crushing the employee
- Working in the elevator pit, struck by car
- Employee performing servicing on the existing elevator, crushed between elevator door and gate door
- Fall through the opening of unprotected (unguarded) elevator shaft (either open shaft where elevator had never been installed or other case)
- Working on new installation or renovation working on height, fall from height
- Other trades working on the construction area falling in the elevator shaft
- Hazardous energy lock-out tag-out, de-energizing electrical circuit

Accidents can be categorized in several groups:

- Accidents that occurred in the elevator shaft (hoistway) on open (not protected) shaft
- Accident that resulted from improperly used personal protective equipment (PPE)
- Not used or properly applied fall protection
- Working with electrical equipment
- Working in the elevator pit
- The effects of the unprotected openings on the floor
- Stuck in between moving objects
- Improper handling and moving of material
- Working with electrical energized circuit
- Use of PPE

Fall protection continues to be a major focus in the industry. Working in or near the shaft, fall protection use is mandatory. These things should be part of the everyday stand-up meeting:

- Proper training on area where to tie off
- What is considered a stable structure to tie off
- Where to anchor and where to position in the working area (ex., working as close to the anchor point as possible)
- Consideration for eliminating or minimizing all swing hazards before commencement of the installation

Use of fall protection is required when an employee is exposed to a fall hazard of more than 6 ft (1.8 m) above the ground. It is important to be aware of swing falls, as can happen when the anchor is not directly above the location where a fall occurs and can increase the likelihood of serious injury or death in the event of a fall.

From the end-user side, accidents may occur because of the lack of proper maintenance; equipment malfunction and equipment aging; improper use of equipment; equipment not being serviced; and other direct and indirect factors. These accidents may be from elevator door malfunction, sudden start and stop of the elevator, improper leveling, loss of power, stop then start moving again to level on the floor and other factors.

As the aging of elevators in residential buildings becomes evident and a critical path of repair and/or replacement is coming, special consideration must be made on all factors of safety. This is perhaps especially critical in the countries without established protocols, an enforced course of action and regulation. In some countries, there is no strong matrix of jurisdictional requirements or enforced regulations; others lack regulation, resources, responsibilities and follow through. This can well be seen as a hazard waiting to happen. There are several red flags that are applicable in these cases. These red flags include the absence of:

- Educated professionals to recognize the hazard
- An authority that will collect and resolve cases involving older elevators
- Processes, although regulations may exist but not be enforced
- Responsibility, established communication between the building manager and residence with timely response and action (in case of required third party to operate with the resident's funds for maintenance purposes)
- Allocated critical path funds for maintenance
- A higher authority having jurisdiction to tackle and resolve the subject matter when the building manager is not performing per the agreement
- Technically trained and certified service employee on the market with knowledge of old and new equipment who will timely respond
- An instrument to monitor, enforce and implement resolution, with public safety in mind

Educating and involving the global elevator community in these critical areas in the countries without specified matrix will open a path for bringing global awareness of safety regardless of the region/

country, bringing synergy of knowledge, operational practices and education. Education and involvement promise to influence decisionmakers that change is a must, and inevitable with proper application and processes, to provide safe elevator rides for the public, especially in aging buildings. Only the industry coming together can influence change.

Conclusion

A long-term synergetic approach to communication among various specialties when designing for people with autistic spectrum is needed. The goal is to deliver a clear message on the importance of the conveying systems and building planning, not only from the aspect of the safety, functionality and compliance with the ADA, but also on the importance of creating a personalized experience for all passengers, including those on the autism spectrum. This is envisioned to provide advancement in elevator planning and design as related to autism in different aspects of the project lifecycle, on the design front and the end users' experience. Starting from increasing the awareness and then approaching the construction industry with specifics, we can bring more mutual understanding about the challenges and needs of people on the autism spectrum, with the introduction of better sensory integration to improve the customer experience and environment for all. This provides valuable insight on the importance of the complexity in nature of conveying systems' design and planning, with autism in mind. ASD and accessibility needs (including those of the aging population and those with disabilities) are rising, and we cannot ignore the urgent need to incorporate changes in design to accommodate everyone's needs.

A long-term synergetic approach across countries to promote safety not only on construction sites, but after elevators are already in service for public use, is urgently needed. The goal is to deliver a clear message on the importance of public safety, along with the conveying systems' lifecycle and building operation, to implement change on a global scale. A common body of knowledge that will act as an instrument of change is needed to raise awareness and implement action globally.

Disclaimer: The author of this paper bases her research on personal interest and observation and is not giving advice nor acting as an advisor. This paper is solely the result of the author's personal research, interests and observations and does not represent the opinion of Everglades University.

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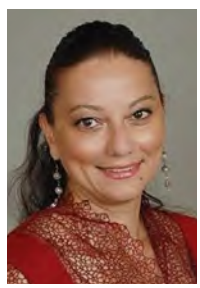

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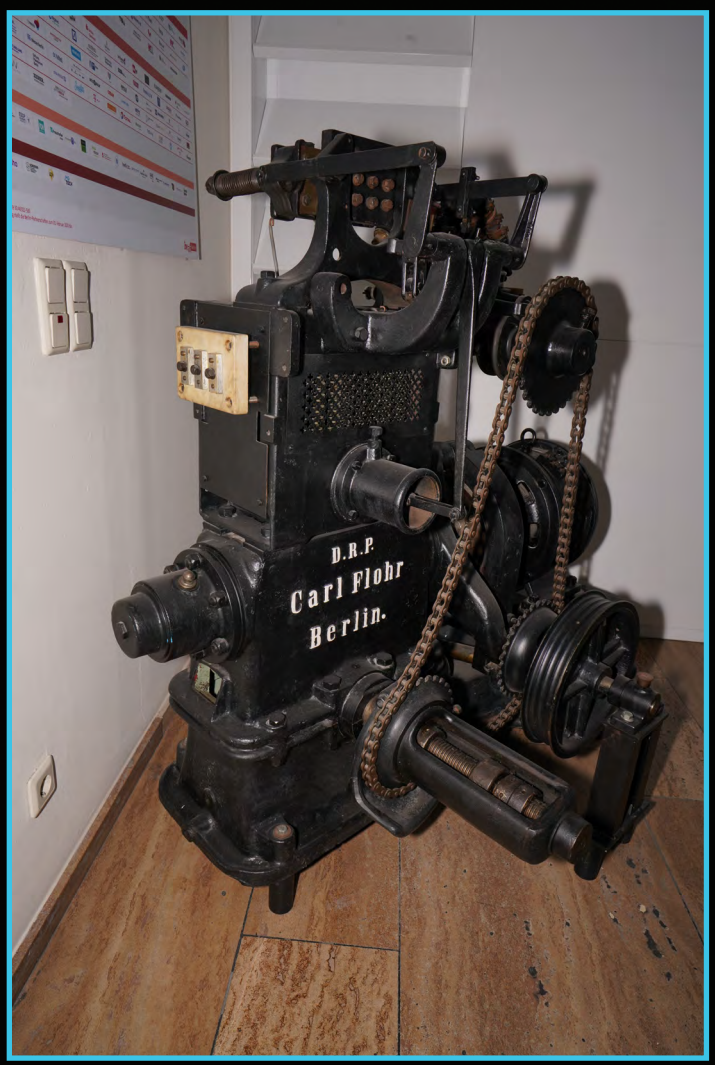
The ReGen Drive reduces electricity consumption during the elevator ride by up to 75%; courtesy of Otis.

"The Next Generation Secures Our Future Life"

Otis lead discusses the technical, economic and human future.

by Undine Stricker-Berghoff



Old elevator machine by Carl Flohr, Berlin, in the lobby on the way to Udo Hoffmann; source: Hans-Wilhelm Berghoff

In December, Udo Hoffmann (UH), Central Europe Market Group lead and chairman of the Management Board of Otis Germany, based in Berlin, Germany, talked to your author (USB) about the "big picture" with a focus on trends in the elevator business in Europe.

USB: ***Mr. Hoffmann, could you please start with telling our readers about your personal and professional background.***

UH: My paths at Otis have taken me to a variety of positions in several countries. My current job involves traveling a lot in Europe. Today is my last day in Berlin for another 17 days. I am constantly exchanging ideas with interesting people within my Market Group — be it in Warsaw, Poland, Vienna, Austria, or beyond. Nevertheless, I always make time for my wife and my daughter.

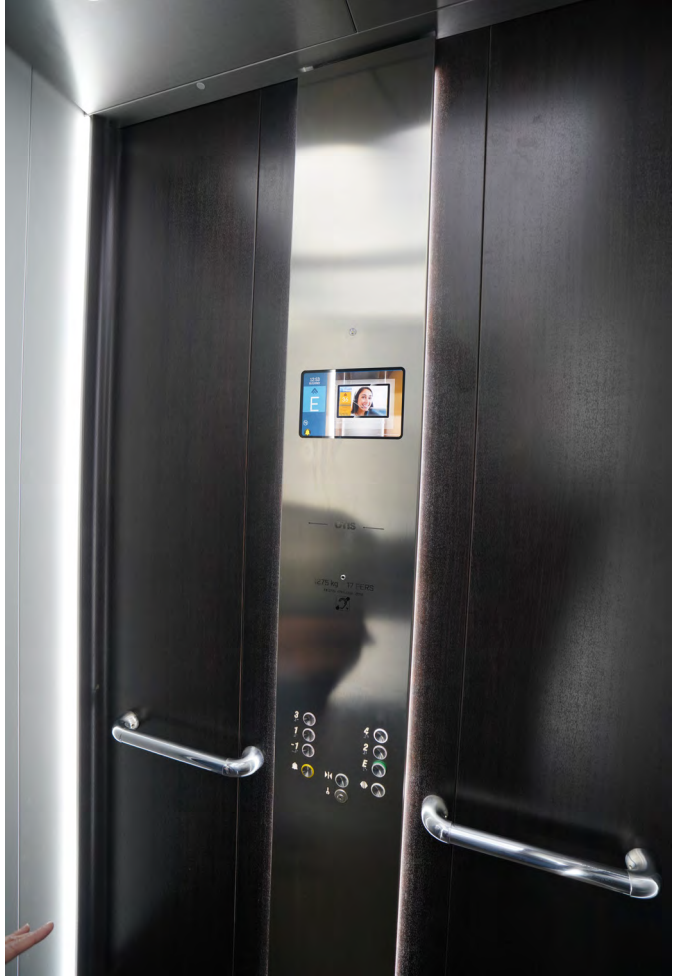
I was born in Eastern Germany. My father was also in the elevator business. I did my apprenticeship as a toolmaker already in the elevator industry. Later, I studied mechanical engineering and worked in construction — at Otis, of course.

Only once, I worked for a few months in another company. At INSEAD in Fontainebleau near Paris, I acquired the additional skills and tools for business administration tasks and built up and expanded my international network. Otis offers a lot, especially for employees. One could say, "Over the course of the years, we have invested in each other."

USB: ***Today, we are talking about the "big picture" with a focus on trends in the elevator business in Europe. Could you please start with highlighting what moves our industry today — technically, as well as economically?***

UH: Three things determine the business: firstly, the service portfolio. It is large in Europe, with Germany as a key player. Secondly, solutions for existing buildings. The population is getting older and older and is using buildings longer and longer. This is a "stomping ground" for innovations.

Thirdly, digitalization. In smart cities, elevators will no longer just go up and down a shaft, but they will connect people within and between buildings in a completely new way. We can already travel horizontally. But with the rise of digitalization, we will be able to use hundreds of millions of elevator data, drawing conclusions from them, and linking them in a meaningful way. In a department store, for example, we will measure traffic flows. People are already, nowadays, online more and more. So, one has to combine the data with their electric cars, for which thousands of charging stations are built in parking garages and private homes. Where will people work in the building and how will they get there? How will the last mile be designed? To answer these and many more questions, we can use the data from elevators.



Latest eVIEW emergency call technology in a Gen2 cabin on the way to Udo Hoffmann; source: Hans-Wilhelm Berghoff

Gen360 was developed for existing and new residential and commercial buildings of lower to medium height; by Arnaud Février courtesy of Otis.

USB: ***We can always learn from history. You have been in the industry for more than 40 years – what do you see as the biggest change in the past decades? And what was the lesson learned?***

UH: The elevator business has always been a people business. Therefore, we are continuously in touch with people such as architects, technicians and, of course, passengers. And what were the results of this exchange? Larger drive machines, for example, with 500 to 900 mm traction sheave diameters. Or overspeed limiters with electrical and mechanical parts that no longer even exist today because digitalization has been a game changer. The innovations are jumping faster and faster to meet customers' expectations.

USB: ***As digitalization is one of the biggest technical trends, which topics are you dealing with at Otis?***

UH: We've been going digital for a long time. The key words here are availability, transparency and remote services. Today, a remote release of entrapped passengers is already possible in some cases. I would like to add a second trend here, which we must not forget under any circumstances: the reduction of our carbon footprint.

USB: ***In 2021, you launched the Gen360 platform. What are its technical features? How are these innovations received by the customers?***

UH: One example of our advanced digitalization is certainly the Gen360 platform, where you can already intervene remotely in the control system. Sensors and cameras record data and images. Architects, in particular, benefit from its design with a low pit, which comes into play in underground garages, for example. Maintenance can be done in the car thanks to a foldable platform so that technicians no longer have to go up on the roof. This also allows for a reduced headroom.

The Gen360 platform has now been on the market for almost one and a half years and is already a preferred choice of customers. We have just signed a framework agreement with Goldbeck Immobilien (real estate) for its use. With the Gen360 platform, one aspiration is to learn from the data and share this data for building operations. The benefits of both sides can be tied together in this way. This is also where our eView screen comes in. For example, the operator can connect with passengers via two-way video.

The Gen360 platform is becoming one of our central products. Its IoT capabilities are currently still in demand and used differently by customers. However, demands in this area will continue to increase. A lot of data is already available today, but many customers are not yet aware of this. Ideas for linking data are increasingly emerging, and new solutions and business models are being developed.

Udo Hoffmann and Undine Stricker-Berghoff on the move; source: Hans-Wilhelm Berghoff.

USB: ***Another big challenge you mentioned – or trend as you called it – is sustainability. Otis publishes its second environmental, social and governance (ESG) report at the end of March. What is your concrete contribution to this topic?***

UH: We take sustainability very seriously. Also, occupational safety and environmental protection play a major role for us. We work on these issues every day and invest in them. For example, we record what is produced when and where in order to optimize production processes and delivery routes; thus, we opened a new factory in Spain last year. For another example, we installed solar power panels on the roofs. Our factory here in Berlin is powered by 100% green electricity. Digitalization and remote services also help us to save energy. And not to forget our ReGen™ drive technology that – when combined with our efficient elevator machines – reduces energy consumption up to 75% vs. conventional elevators without regenerative drives.

USB: ***Let's move from the technical to the economical side. What is the importance of the European market from the point of view of a global elevator manufacturer?***

UH: From a global perspective, Europe is a key region for Otis. Globally, we generated around US$13.7 billion in sales in 2022. As I mentioned, service is a big part of the business, and our portfolio in Europe is huge. It is also a strategic territory for innovation: Europe is a mature market with customers and passengers constantly pushing us, especially on the environmental side.

USB: ***What are the impacts of the COVID-19 pandemic?***

UH: I can't praise enough how quickly our organization and IT enabled remote working. People arranged quickly with the new situation; teams were fully functional. Business has continued. Simply impressive! At the peak of the pandemic, some customers were concerned about letting our service technicians into their building. But with masks and testing, we got a handle on that, too. The pandemic showed the robustness of our service model and the resilience of our business: People were moved on without realizing the tremendous effort of the Otis staff in the background – also and especially during the pandemic.

> "Otis offers a lot, especially for employees. One could say, 'Over the course of the years, we have invested in each other.'"

The pandemic has been a driver for innovation, too, as the need for hygienic solutions in public space has never been that strong ever before. This was reason enough for Otis to offer such solutions as, for example, germ-killing blue-violet LED light in elevators and for handrails of escalators or touchless "buttons" to call the elevator or choose the floor.

USB: ***What impact has the energy crisis due to the war in Ukraine had?***

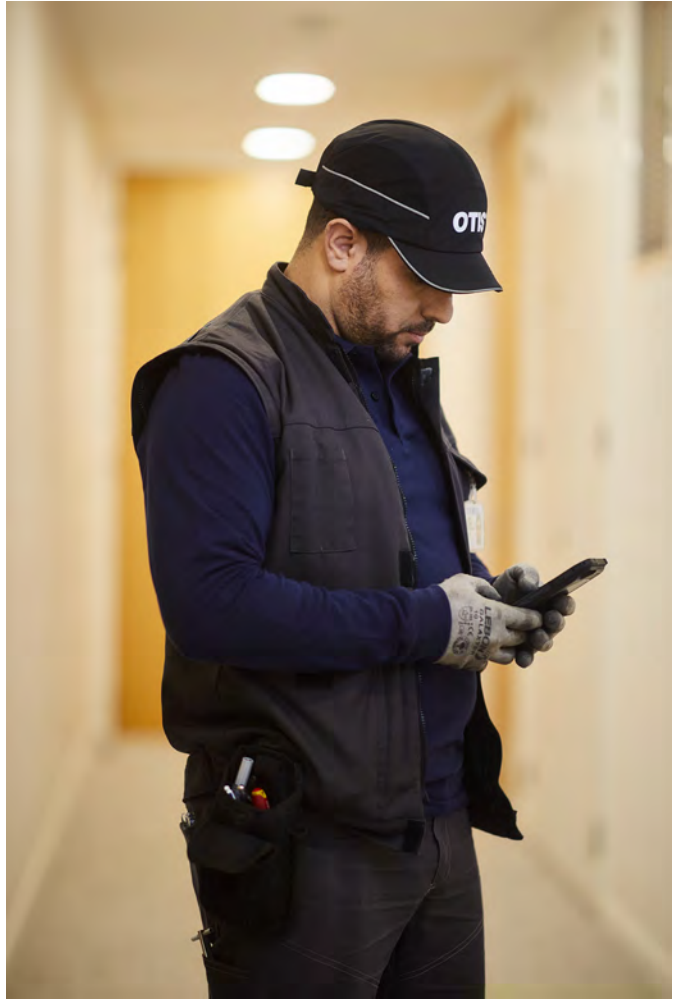
UH: We have been transparent with our investors in how we are addressing headwinds in energy and materials costs. In general, there are currently different disruptions in business operations, but this is – at least in our case – not due to Ukraine. It's important for me to add, that Otis continues to work in Ukraine. The service there continues to keep people vertically mobile.

The crisis has highlighted the responsibility we all have to reduce the ecological footprint of our products and activities. We have seen an increased interest from our customers on the subject. And even if elevators have been energy efficient for a long time and by design, modernizing or offering new efficient products allow us to contribute to a better management of energy resources.

USB: ***What short-term outlooks do you already see for 2023?***

UH: Digitalization is taking the next step for us with connecting more and more elevators to our IoT solution Otis ONE. We have prepared ourselves for many changes in the communications network, especially in Germany. I also see the decline of COVID-19 as positive – or at least, we are getting used to it. The German government has set

The eVIEW cabin display offers entertainment, cabin functions, information, system surveillance and emergency call technique with video transmission; courtesy of Otis.



Otis ONE uses AI, machine learning and cloud technology to provide service technicians with predictive findings concerning their service operation; by Steeve Josch courtesy of Otis.

the target to build 400,000 new homes in 2023. That means thousands of opportunities for new equipment. We will continue to invest – we feel strong! We are not afraid of the future; on the contrary, we see opportunities. All market players have opportunities. Let's stay positive and invest our brainpower in the question: How can we achieve our specific targets?

USB: ***One central question of the industry in the future, which we did not mention yet, is human resources related. How are we to find qualified staff? What can and what should industry do?***

UH: Young people approach things differently. The attention span is decreasing. The speed of change is increasing. Young people have different values and ideas, and we as an industry have to deal with that differently. We have to be at the pulse of time; jobs have to be more interesting and more varied. Young people don't stay in the same company for 40 years, like I did. Today, it is too late to recruit young talents when they are about to finish school. We have to introduce people to the elevator industry at an earlier age. Getting talent is hard work. We must and will train young people ourselves with apprenticeships and dual study programs. This is an investment that will pay off. The next generation secures our future life.

I also discuss this topic with my wife and daughter. Elevators are also still a male domain; but this is not a law of nature. We strive to have diverse teams that show high commitment and inspire great ideas to flourish. By 2030, we want to have achieved gender parity across Otis' global executive positions. That revitalizes our company.

One example of our many activities to recruit and nurture young talent is our third annual student challenge, "Made to Move Communities." The aim of this worldwide program is to spark an early interest in Science, Technology, Engineering and Math (STEM) as well as in mobility.

USB: ***Last, but not least, something personal: When you enter a lively discussion about a topic close to your heart, what would it be about?***

UH: I would probably share my learnings from more than 40 years of professional life: You should always keep your feet on the ground and never forget where you come from. You should always look forward instead of back. Family is important. Change drives us forward; challenges drive us forward – you just have to be open to it. So, do what you enjoy; stay where you have fun; then, work evokes high spirits!

CAN XL at Germany Tradeshow and Beyond

by Kaija Wilkinson

CiA association says evolving communication platform holds promise for the elevator industry.

The nonprofit CAN in Automation (CiA) association hosted a booth and Bosch, NXP and Vector presented running CAN XL (extra long) open-standard communication networks at the Embedded World tradeshow at NürnbergMesse in Nuremberg, Germany, on March 14-16. Control Area Network (CAN) technology is widely used in automotive and industrial automation applications and is the basis for communicating with CANopen and DeviceNet protocols.[1] CiA Managing Director Holger Zeltwanger tells ELEVATOR WORLD CANopen Lift, the CAN communication platform for elevator control systems (EW, July 2018), is currently based on Classical CAN, the first generation of the CAN protocol. CAN XL is based on the third generation of the protocol and is still in the prototype phase, which means only engineering samples for protocol controllers and transceivers are available. "CAN XL is more than just a data link and physical layer improvement," Zeltwanger said. "It is a complete ecosystem." CAN XL provides embedded management functions that allow different higher-layer protocols to run simultaneously, thereby supporting virtual networking. Optional functions include CANsec (cybersecurity at line speed).

Mass production of CAN XL is expected by 2026. According to CiA, CAN XL, like any CAN technology, is applicable to the elevator industry, but will first be used by the automotive industry, which was the case with Classical CAN and the second generation, CAN FD (flexible database). Zeltwanger said:

"As you may know, the elevator industry is very conservative – not adopting new technologies as quickly as other consumer markets. Nevertheless, the elevator industry also looks to the future. CAN XL is an approach that fits future needs of lift makers. It provides frame length of 2024 byte (versus Classical CAN with 8 byte) and transmission speeds up to 8 Mbit/s for longer distances (versus Classical CAN with 250 kbit/s). Although this still needs to be evaluated, it would allow for more data for cloud services, diagnostic services, voice-over CAN applications, etc. Within the CANopen Lift Specification Working Group (WG), we will evaluate CAN XL at one of the next meetings. But we are not in a hurry, since the technology is just arriving."

At the Nordic Lift Expo 2023 in January, Zeltwanger said he heard about U.S. elevator companies wanting to learn more about CANopen lift specifications. Organizing a seminar to educate the North American elevator industry about this open-standard communication specification, which "enables users to easily integrate devices from different manufacturers," is a possibility. In Detroit in April, CiA organized two events aimed at American automakers: the CAN XL Plugfest and CAN XL TechDay. "This is also important for the elevator industry, since the adaptation in road vehicles increases the volume, in turn driving hardware prices down."

Oskar Kaplun, an engineer at CiA, observed the elevator industry can benefit from CAN XL, but it is not yet clear how it would fit with existing solutions or if it will become a "must-have." Currently, Kaplun said, the CiA Lift WG focuses strictly on CANopen based on Classical CAN, which it has done for the past 20 years. The WG sees no obvious benefit of switching to even CAN FD, he said, continuing:

"Efforts of the WG resulted in a standardized CANopen interface for lifts that's been available on the market with constantly evolving features for 20 years. The WG will surely evaluate CAN XL [for lifts] once it becomes available on the market. On the other hand, companies that develop proprietary CAN-based protocols and do not bother with a standardized solution for lifts can start to integrate CAN XL anytime, once the microcontrollers with CAN XL controllers become available for industrial automation. That is expected in about four to five years. I imagine that CAN XL can be used in CANopen or a proprietary CAN-based lift protocol for predictive maintenance, big data collection from the embedded lift CAN network, firmware updates and, of course, to facilitate less time-consuming process communications and communication traffic control."

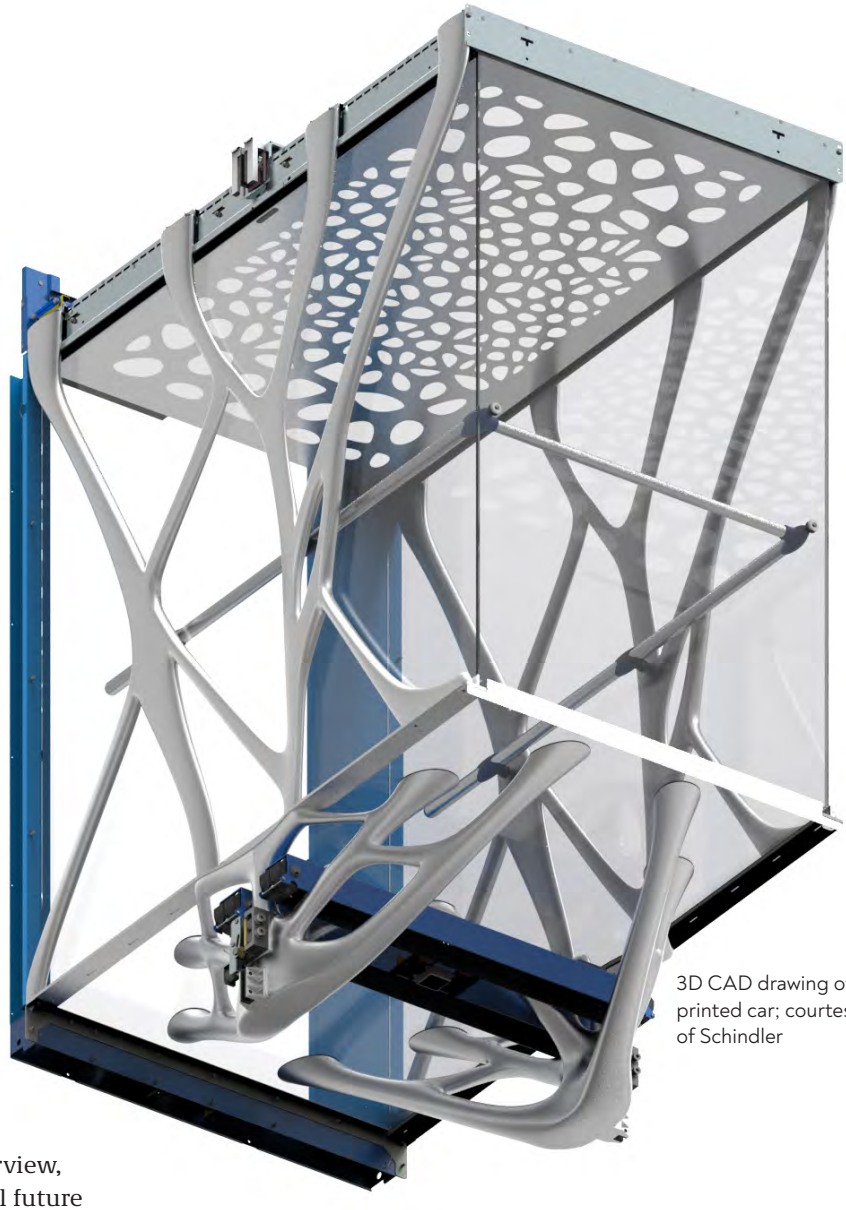
Reference

[1] ccontrols.com/tech/can.htm

"Is There Even More?"

3D printing in elevator manufacturing

by Undine Stricker-Berghoff



3D CAD drawing of printed car; courtesy of Schindler

Your author, Undine Stricker-Berghoff (USB), recently talked to Oliver Simmonds (OS), graduate engineer (University of Applied Science) in mechanical engineering and principal engineer at Schindler in Ebikon, Switzerland. In the interview, the main topic was 3D printing as a potential future production technology in elevator manufacturing. You will get an insight into the first applications at Schindler including their 3D printed car, tests, results and a rough prognosis for the future use of this technology.

USB: ***Mr. Simmonds, could you please tell us about your personal and professional background?***

OS: I am a mechanical engineer, educated at the University of Applied Sciences Northwestern Switzerland. I started my career as a machinery draftsman. This is the third time I have worked with Schindler, in total more than 15 years. Immediately after graduating, I worked here on the development of safety gears for high-speed elevators. After that, I worked outside in start-ups on e-mobility and yacht architecture. I worked independently at one time to advance the technology of electromobility; at that time, I also had orders from Schindler.

Simmonds; courtesy of Schindler

Now, on my third go on the development side, I'm more involved with the research of new technologies. I follow up on technologies and look at them closely, considering how to incorporate them into new products. Of course, I follow trends, but I look more deeply into the technology itself. I have discussions with manufacturers on the state-of-the art to get to the core.

USB: ***Our general topic today is 3D print in the production of elevators, escalators and their components. What is your actual personal involvement in this technical topic?***

OS: I have had a strong personal interest in 3D printing for a long time, which fortunately I have been able to transfer to my professional environment. I promoted the topic at Schindler and then delved deeper into the question: "What might originate out of it?" Doing this, I had my eye on more complex parts that could be manufactured in very small batches at an affordable price.

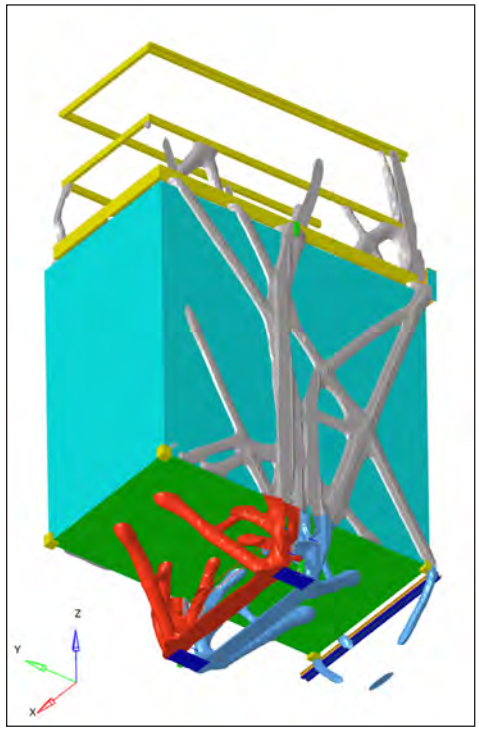
USB: ***Can you please explain what signifies the term "3D printing" as one form of additive manufacturing?***

OS: The technology has improved greatly so it can be used for samples and small batches. There are X varieties of plastics and metals such as steel, copper and aluminum that need to be understood. The variety of materials and the correspondingly differing processes do not result in only one, single 3D technique. However, the common factor is always that material is built up in layers. Technically, these processes are referred to as "additive manufacturing." However, the term 3D printing has become established in the popular language.

In the 1990s, the road began in the U.S. with the processing of powder on a type of inkjet printer. Resin was applied to a surface to bind the powder to the selected area. This is where the term 3D printing comes from.

Today, we mainly use the Fused Deposition Modeling (FDM) process, also called Fused Filament Fabrication (FFM). In this process, plastic is heated and pressed through a nozzle. The method is inexpensive, widely available and leads to good results. There is also the so-called powder bed process, which works with metal as well as plastic.

In our project, the car was built using the Wire Arc Additive Manufacturing (WAAM) process. A welding robot runs according to the design "drawing" and applies the material layer by layer.

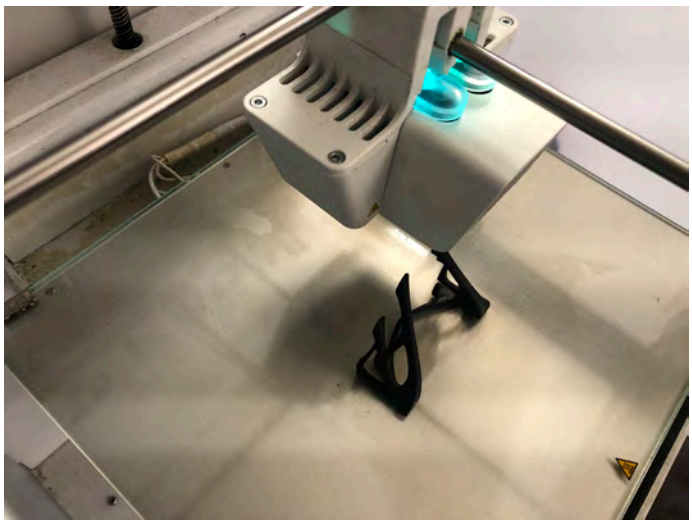


Topology optimization of the car; courtesy of Schindler

USB: ***Behind these various calculation methods for optimization, I adumbrate a longer history.***

OS: We've built up all this over the years, especially the design tool, always following the progress of digitization. We used to draw designs in ink. The enormous change has led to a largely paperless office. The entire work process has been digitized, which means that we no longer make drawings by hand for 3D prints, either.

USB: ***In your company, you start with 3D prints very early on in the careers of your staff. Already for apprentices, you offer metal and plastic 3D printers as tools. What is the next generation doing with these printers?***


3D printers used by apprentices at Schindler; courtesy of Schindler

Installation robot Schindler R.I.S.E at work; courtesy of Schindler

Steel bridge in the city center of Amsterdam, The Netherlands, "printed" by MX3D; courtesy of MX3D

OS: We believe that it is time to bring the process into everyday life. 3D print technology has been available to everyone in the company's R&D department for some time; small devices are placed in almost every office. The apprentices also need to know it. That is why we are already using the FDM process in our apprentice workshop. You can have a look at the printers and processes at schindler-berufsbildung.ch/de/dienstleistungen/konstruktion.html#c12_tabs-4d341ec6cd-item-1075e81d2b-tab.

USB: ***Why do you involve the next generation in this technology?***

OS: Young people can already integrate 3D into their everyday work. They find it easier than some older people. If 3D is already part of everyday life in R&D today, it will accompany the next generation in production throughout their whole lives. It is important to prepare them for this.

USB: ***Back to R&D. At what stage in production or for which products do you see opportunities for 3D printing, and why?***

OS: We work conventionally in the production of elevator components by means of milling and lathing, also in plastic. For our Schindler R.I.S.E installation robot, for example, cover parts made of plastic would come into consideration. These would exactly meet the targeted niche: customized parts in small series. In larger quantities, 3D printing is still too expensive and too slow.

USB: ***What about spare parts?***

OS: Generally, yes, but if plans are still available, they can also be produced quickly and inexpensively, computer-aided by conventional means. It has formerly been milled according to drawings, etc. Why should I change the process? The situation is different for old castings, for example, where molds are no longer available. These have usually more complex shapes that are difficult to produce by conventional means.

USB: ***And why is 3D printing not already used much more often then?***

OS: The main difficulty in metal applications is the availability of reliable and reproducible material specifications. Many factors during the printing process must be controlled within narrow limits in order to achieve the desired quality. Often, only very specialized companies have these processes under control. Therefore, the obstacle to wider application is the lack of warranties and quality assurance measures. There are many approaches in this area, as well. The first printing system manufacturers are already issuing warranties. These materials are already being used in aircrafts and jet engines, for example, but still require bigger investments.

Floor structure ready to be mounted; courtesy of MX3D

View from inside showing handrail mount, side and floor structure; courtesy of Schindler

Welding robot during the "printing" process of car parts; courtesy of MX3D

USB: ***As far as I know, you already tested printing elevator cars. Are there any other items on which you have already worked within Schindler?***

OS: Before we created the car, we had realized 3D-printed casting molds for a motor housing. We were looking for a part with a topology that could be optimized using mathematical methods. This applies to the car; its design has the forces in the frame as a determining boundary condition. With the help of software, the structure of the car can be optimized.

The whole thing started with a study of what is possible with 3D printing in terms of optimization. It's like a tree: Where it needs nothing to strengthen, there is nothing — the branches are thinner than the trunk. We didn't draw the design, but calculated it. The result was optimal in the first stages, for example, in terms of the use of materials, which is much lighter, but it could no longer be produced conventionally.

The whole thing only became feasible with 3D printing. So, our main concern with the car was to demonstrate that it was feasible. Can 3D printing achieve the calculated material reduction? Yes, 3D printing can! Consider this car like a concept car in the automobile industry.

USB: ***Let's go then into this specific car project. When printing elevator cars, you call it art. Could you please tell our readers what is behind this unexpected label?***

OS: I clearly detect the "art of engineering" in this, just as it always gave technology an aesthetic face in the early days. In retrospect, architects, too, used to be artists. Steam engines were decorated and painted. This aspect has been lost in industry. Everything became straight. Looks cost — and no one wants to pay for that.

3D printing brings together these two worlds. You can "slim down" and optimize, still keep the earnings high in the industry and the result is pretty to look at.

There used to be beautiful mosaic floors. Today, with 3D printing, they're feasible again. We will see many things once again.

What you develop as an engineer must also look good. This increases acceptance and sales figures in equal measure. For more information, have a look at group.schindler.com/en/media/stories/when-engineering-meets-arts.html.

USB: ***Who was in charge of the actual execution of the printing itself?***

OS: The car is approximately 2.1 m deep X approximately 1.2 m wide X approximately 2.2 m high inside, with a superstructure even 3 m high in total. The printed parts were manufactured at MX3D in the Netherlands. There, innovative manufacturing processes based on industrial robots and wire welding processes are developed and tested. The company had also printed a steel bridge over a canal in Amsterdam before building our car. The steel was easier to process than the aluminum of our car. Printing large aluminum structures was new territory for everyone involved, which required a lot of input from everyone. Many tests were necessary in advance to achieve an acceptable result.

USB: ***Which metal did you use in this process?***

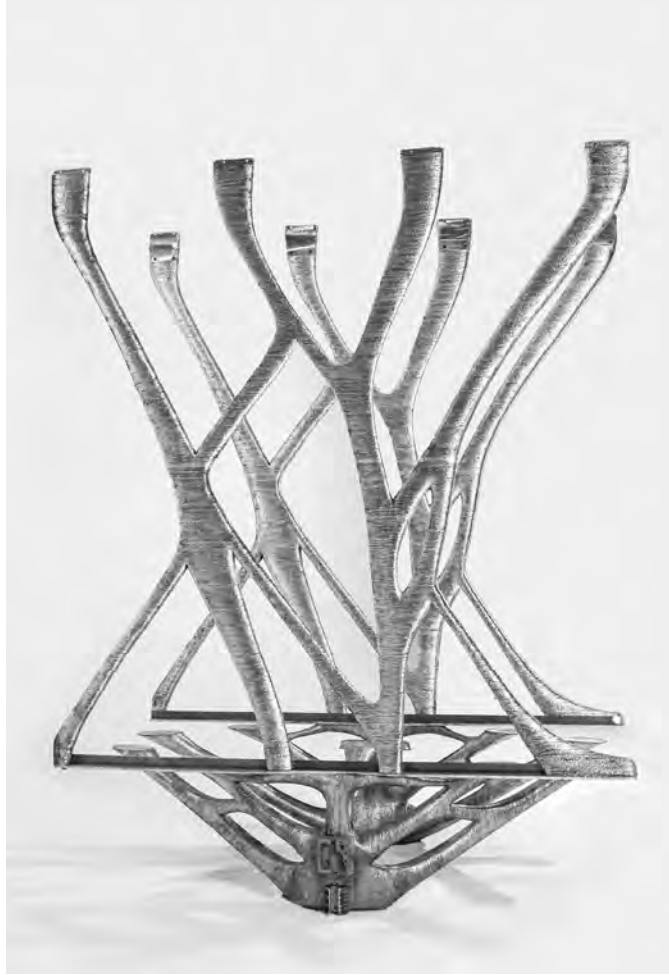
OS: As previously mentioned, we used aluminum to realize a lightweight construction. Welding aluminum requires a lot of know-how. Plastic is much bulkier to achieve comparable strength. Steel also has minimum wall thicknesses, which makes it much heavier. However, we did not want to add unnecessary mass to the elevator system. Our exact goal was to build the optimized structure light. This would not have been reasonably feasible in plastic or steel. By using aluminum, we also wanted to inspire others.

USB: ***Which parts of the car were printed?***

OS: We printed the structural elements of the car, that is, the floor and the sides. So, in total, three parts were produced: the floor, the left side and the right side. The floor, in turn, consists of four mirrored parts that were welded together afterwards. The two side parts were split horizontally and then welded together. It would also have been possible to make one large part each, but the assembly was easier than letting a 2-m robot arm handle the print. But we had some respect for the assembly. For example, the installation space for the floor structure was too small. The rest was put on afterwards, conventionally prefabricated. It consisted of a standard roof structure, glass walls and floor, as well as the door and its suspension.

This "printed" car did not run because the uncertainties are too high. Specifically regarding material safety, no verification is possible. It is walkable, but not drivable.

USB: ***What was the motivation behind this project?***



Finished printed structural elements; courtesy of MX3D

Side view with mounted glass walls; courtesy of Schindler

OS: We aimed to learn the processes and the state of the art. Within the timespan of one year, we completed the calculations and the manufacturing. One and a half people in our house were actively involved in the project in this time, plus the colleagues from the Netherlands.

USB: ***What was the outcome of the project?***

OS: We have shown: "It can be done!" We have learned a lot – also about the limits and weak points. And, of course, we are now asking ourselves: "Is there even more?"

USB: ***What are your future plans concerning 3D printing at Schindler?***

OS: At the moment, we have yet to set up a follow-up project due to the lack of quality assurance for the material. There is a lot of interest in the group to use 3D printing and to run the results in highly visible places. But it is in the nature of our work in the New Technologies Department that sometimes the time is not yet ready. We will continue to monitor the technology, and, perhaps, in a few years, we will move forward with it in concrete terms.

USB: ***Is there even more potential for 3D printing?***

OS: Probably. In our Schindler magazine, we gave some information about a whole building which was already printed in concrete. You can find the article with more details at magazin.schindler.de/architektur/haus-aus-dem-3d-drucker.

USB: ***Would you like to end our Q&A session with a personal statement?***

OS: I love my job at Schindler in research. It's exciting to observe new production processes, think about what we can do with them, try them out and, perhaps, change the future of the industry substantially as a result.

Undine Stricker-Berghoff is the owner of ProEconomy, a Luebeck-Travemünde, Germany-based engineering office through which she works as a coach and consultant for management and marketing, mainly in energy and building services. From 2008 until 2013, she managing director of VFA-Interlift e.V. in Hamburg, Germany. She studied mechanical engineering at Ruhr-University Bochum, Germany, and, immediately after graduation, worked as an energy consultant for ERPAG in Lugano, Switzerland, and Campione, Italy. Prior to joining VFA-Interlift, Stricker-Berghoff worked for VDI, the Association of German Engineers in Duesseldorf, Germany, as secretary for Building Services, and was in charge of the VDI-Standards department. She also served one term as director general for the Luebeck Chamber of Commerce and Industry. She has operated ProEconomy since 2005.

Technical Specifications of the "Printed" Car

Width: *1,200 mm*
Depth: *2,100 mm*
Height: *2,140 mm*
Load: *1125 kg*
Weight of empty car: *850 kg*

Assembled elevator car with standard car roof; courtesy of Schindler

Meeting Demands, Rising to Challenges

A look at the U.K. and Nordics VT markets and beyond

by Kaija Wilkinson

Otis Market Group Lead U.K. and Nordics and Managing Director U.K. Andy Bierer (AB) is ultimately in charge of approximately 2,200 employees across nine countries. This, of course, involves thousands of unique customers and market variables, all under a larger macroeconomic and global trend umbrella. Bierer took the time to speak with your author (KW) about the challenges and opportunities of this major market group, as well as larger trends shaping the company and the industry.

Andy Bierer

KW: ***What distinguishes the U.K. and Nordics markets from those in say, North America and Asia?***

AB: The U.K. and Nordics market group consists of nine countries: Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden and the U.K. On the surface, what makes the group most different is that, with nine different countries, there are nine different levels of complexity for how you conduct business to meet the statutory requirements — different codes, unions and unique customer demands in each market; this is markedly different from the U.S. However, one thing most have in common is that they are fairly mature and stable markets; this is similar to the U.S., but not Asia, which is still broadly an emerging market.

KW: ***So how does Otis address that?***

AB: We've done it several ways. It starts by having a clear set of priorities. As a team, we spend a lot of time visiting and listening in on all the individual countries and ensuring we adjust our priorities in a bespoke way for the local markets so we're supporting and capturing their local opportunities. That's the first thing we do. Then, it informs what goes into our strategic framework, which is the top set of objectives we set for ourselves annually. We go through an internal process each year and decide which actions will have the most impact and focus on those. When we travel to these markets, we hear which demands they have for new products. We also listen to what they want in terms of service, both now and in the future. Across both, a lot of that is tied back to digitalization. We've been able to meet some of these countries' growing demands through the deployment of our Gen360TM fully digitally native elevator platform. It's a new release for us and will serve the new equipment and construction markets.

"Who wins the war for talent will be a deciding factor for the future."

On the service side, we've been able to build on our existing digital architecture for Internet of Things (IoT) connectivity with a product we call Otis ONETM. We've had a great running start with how we extract data from our elevators and escalators: We've been remotely monitoring elevators for more than 30 years, so we already have material levels of connectivity in place. We're now taking it to the next level by investing in devices that, essentially, create a digital twin of any elevator where we can see in real time exactly what's going on with it, irrespective of whether it's brand-new or of an older vintage.

KW: ***Other than the fierce competition, what are the main business challenges in the U.K. and Nordics and how are they being addressed?***

AB: I think we all find that the labor that's available doesn't quite match with the growth ambitions of the construction market today. We need to figure out how to get more people into our business. A lot of us are competing for the same talent, whether it's the elevator and escalator trade competing with electricians' roles or HVAC (heating, ventilation and air conditioning) roles or another kind of building service industry. Who wins the war for talent will be a deciding factor for the future.

KW: ***In my opinion, vertical transportation (VT) is sexier than HVAC or being an electrician. Maybe that could be showcased to young people.***

AB: As a 15-year elevator man, I fully agree with you. One of the things we've done differently, and what makes us special in the market, is our investment in apprenticeships. This works differently than in the U.S., because a large portion of U.S. elevator companies are International Union of Elevator Constructors (IEUC) signatories. The IUEC is a great partner for apprenticeships that provide a direct path to the elevator trade in the U.S. Here (in the U.K.), development of apprentices and investment in apprenticeship programs is solely up to the individual companies. Several years back, to the credit of my (Otis U.K.) predecessors, Otis decided to launch an apprenticeship program here. There are always going to be market constraints and challenges, but that program really helps us manage them: we can say to young, talented people looking for a career that, "Here's a path for you," and that's something that differentiates Otis from many of our competitors in the market.

KW: ***What is your business outlook for the countries you oversee, and what will be the main business drivers?***

AB: As mentioned, these are mature markets and, with that, they are fairly stable. Our mix of service and new equipment is similar to that of the global business. The service business, irrespective of macroeconomic effects, remains fairly stable. We also find that, in terms of capital market contraction or even warning signs of recession, funds tend to be reinvested in existing assets, which benefits our modernization business as we provide renovation solutions across our industry-leading portfolio. People reinvesting in their assets drives repair volume, as well as full modernization. We're very well-placed in all of this. So, in terms of business outlook, we're seeing positive inertia still on the construction side and a lot of activity from last year continuing uninterrupted into the new year. We're going to be carefully watching that across all markets into the back half of this year. Whatever happens, I still feel confident that the mix in our business will help us remain stable and continue to grow.

"The industry continues to have more data at its fingertips than ever before, which allows us to introduce new ways of doing things."

KW: ***Tell me about how Otis is on the cutting edge technology-wise.***

AB: Gen360 is the first digitally native elevator on the market. Through digitalization, we can provide enhanced safety and more flexibility in planning and design. In addition to that, Gen360 delivers a step change in how we look at the design of our units and the flexibility it provides to architects or developers. Additionally, it introduces a new electronic architecture which will have service benefits. When you think about everything previously being highly mechanical, that's really a distinguishing difference. Think about your vehicle or some of the things in the aerospace industry where they've gotten past the mechanical interfaces and are using more electronics. That's something that we are moving toward. We have improved visibility and can glean more insight because of that digital architecture that also enables IoT. That's just on the construction side.

On the service side, we have Otis ONE, which is an IoT solution we've developed. It paves the way for what we call "smart maintenance." Otis ONE is an IoT network that feeds the data we're obtaining into the cloud. We have a data lake where information is aggregated, enabling us to glean useful insights into asset performance, which in turn informs how we deliver our maintenance services. For example, if the elevator in the building where you live shuts down and you have to call for service, it's highly likely that the technician who will be arriving at your property will have already seen the faults that led to the shutdown, thanks to the speed and instant visibility provided by digitalization. We can even intervene remotely on many issues. But, if they can't, the engineer will still have a head start and know exactly where to begin the in-person troubleshooting, as opposed to going through a traditional, top-to-bottom process. This enables Otis to get your elevator back into service faster. That's really the power of technology: We have all this data and connectivity available from which we can pull diagnostics and prognostics to ensure maximum uptime.

KW: ***Would it be safe to say you feel this is a boon and a help to VT technicians, rather than a threat to their jobs?***

AB: Yes. I see it as a tool for engineers (mechanics). We can't get enough engineers into this trade, but when we do get them in, we are able to help them work more efficiently and safely because of the technologies we're introducing. The industry continues to have more data at its fingertips than ever before, which allows us to introduce new ways of doing things. We want to push the boundaries of the industry and don't want it to be stuck where it was 30 years ago. Otis will continue introducing new services and products based on IoT and APIs to constantly improve the experience, ultimately for the customers and the passengers.

KW: ***Anything else you would like to add?***

AB: On behalf of the whole team, I want to say "Thank you" for the recognition of the 22 Bishopsgate project ("Project of the Year," Elevators, New Construction, ELEVATOR WORLD, January 2022). That was really exciting for everyone involved. The project is in London, but it was truly international. Throughout the project, Otis had team members from more than 12 countries involved. We also built it during the pandemic. Our engineers, technicians, testers, and project managers all have their fingerprints on it, and they really felt that win.

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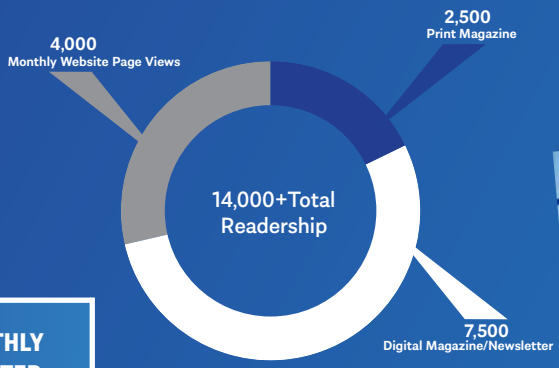

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Analytical Method for Defining Requirements for Elevator Rescue

by Hilkka Hämäläinen and Jaakko Kalliomäki

This paper was presented at the 2022 International Elevator & Escalator Symposium in Barcelona, Spain.

Abstract:

Elevator rescue situations can be classified in different categories depending on if the car is in the door zone, can be moved there or is stalled between landings. Rescue methods where passengers can be released directly to the landing are safer than using car-to-car rescue operations, trap doors or such. Yet the rescue requirements in EN 81-20 and A17.1 cover only manual moving of the car and brake release but are otherwise ambiguous.

Exceeding the minimum requirements set by the safety standards can be done through various methods for releasing a stalled elevator. The main benefit is increased passenger safety. In addition, most rescue situations can be managed by elevator technicians without having to burden emergency services, if not necessary, due to medical reasons. Avoiding the use of emergency services also reduces risk of damage to the elevator during rescue.

However, depending on the requirements, these complementary methods may become very complicated, so a systematic way is needed to evaluate in which situations should it be possible to move the car to the landing.

This article assesses the current standard requirements and presents an analytical approach for evaluating fault situations that may lead to a stalled traction elevator, focusing on high-rise elevators. A detailed analysis of one stalled scenario is explained, including the chain of events leading up to it and under what circumstances special methods are needed for moving the car to the landing.

Finally, there is an example of how a summary of the different scenarios could be used as a basis for defining the rescue scope and requirements for the rescue methods. The approach can be applied on a product platform level or for individual elevators.

A similar method could be used in the future for defining rescue requirements in elevator safety standards.

1. Introduction

Since the introduction of machine-room-less elevators (MRLs) in the 1990s, new technologies have been introduced in elevators at an ever-growing speed. This has led to the realization that releasing entrapped passengers requires higher and more specific skills than before, and that passengers are at a greater risk due to use of unsafe release methods versus if they were left in the elevator car until competent persons arrive.[1] The requirements given by standards were analyzed against this background.

The presumption for this paper was that rescue scenarios, or passenger release scenarios, could be systematically analyzed and categorized based on their difficulty and likelihood. Following the analysis, it could be decided for which scenarios — beyond the standard requirements — it would be feasible to develop release methods and have the tools available on-site. This work could then be utilized during development of new elevator products to identify safety improvement potential in existing installations and contribute to the evolution of elevator standards.

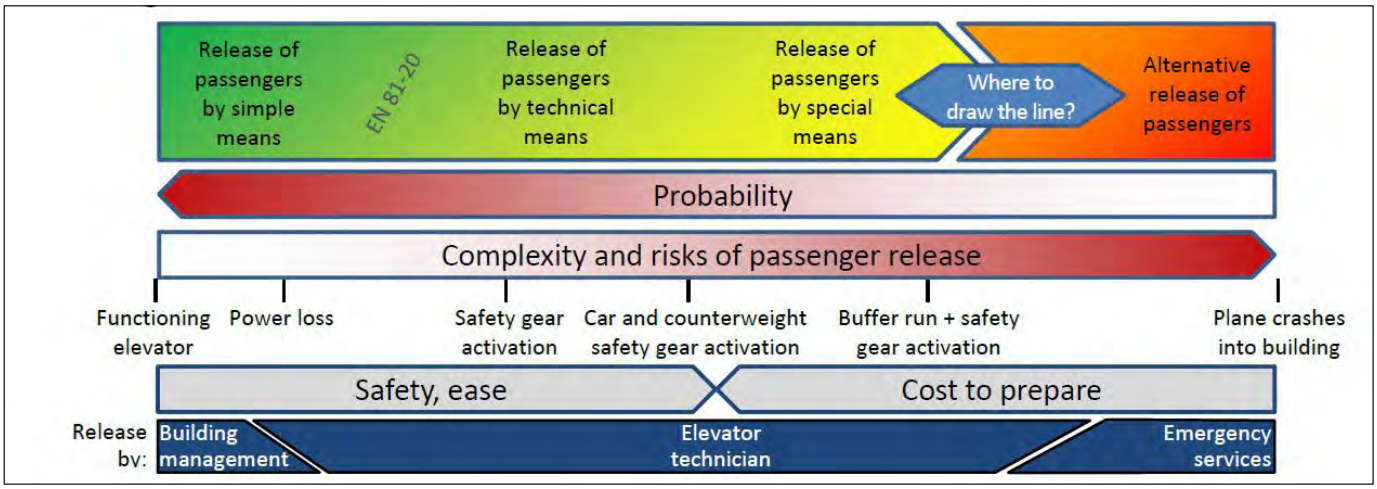

Figure 1: Various aspects of rescue or passenger release. Simple, technical and special means stand for releasing passengers to the landing, while alternative release refers to the use of emergency doors, etc.

2. Background

Rescue systems can be relatively expensive, especially for high-rise elevators, and manufacturers may offer these as options, so the builder may choose to not purchase them unless clearly specified.[2] The time it takes to release passengers may also differ greatly between solutions.[3] Ambiguous terminology and standard requirements that are subject to interpretation may lead to unhealthy competition and expose passengers to unnecessary risks. For these reasons, among others, an analytical method for defining rescue requirements was needed.

2.1 The Problem of Terminology

The terminology used in relation to rescue has been often criticized[4, 1] for overdramatizing the situation. The term "emergency" includes the notions of danger and haste. "Rescue" is also closely associated with danger, while the emphasis should be on prudence and safety. Yet, both "rescue" and "emergency" terms are used in EN 81-20:2020.

Further perplexity is created by nonstandard-based terms like Automatic Rescue Device (ARD), which refers to battery-driven systems that are able move the elevator car to the landing in case of a power outage.[3] However, systems from different suppliers may have very different specifications.

The approach in this paper is to talk about releasing passengers to the landing using simple, technical or special means depending on the difficulty of the passenger release operation, as shown in Table 1. Alternative means are used as a last resort to release passengers when direct release of passengers to the landing is not possible. The terms "rescue" and "emergency" are used mainly when referring to the standards or medical urgency.

Release category	Definition	Example of passenger release scenario
Simple Means	Release of passengers to the landing when the car stopped is in the unlocking zone or has been moved there automatically	Car stalled in unlocking zone **or** power loss and car is returned to the landing autonomously using back-up power
Technical Means	Release of passengers to the landing - From outside the unlocking zone or - By moving the car to the unlocking zone using gravity or electrical emergency operation	Power loss and car returned to landing by manually releasing the brake or car is stopped beyond final limit and is returned to landing using electrical emergency operation
Special Means	Release of passengers to the landing by moving the car to the unlocking zone using special tools and techniques	Unintentional safety gear activation, unfavorable balance and electrical emergency operation not available
Alternative Means	Release of passengers not directly to the landing	Elevator immobile due to machinery bearing failure, emergency doors of adjacent cars are used to release the passengers

Table 1: Categorization of the different passenger release means

2.2 Situations Meriting "Emergency Rescue"

While, generally, passengers in a stalled elevator are not in a dangerous or distressing situation[4] (an assumption that is also taken in this paper), there are situations in which fast rescue may be needed due to medical reasons. There has also been discussion about whether the ventilation dimension defined by standards is adequate for fully loaded cars.[5] The situation may be particularly acute if the ambient temperature is high and custom-installed car interiors (or retrofitted air-conditioning units) may restrict the ventilation. [3] For these reasons, continuous communication with the entrapped passengers is critical to assess if extreme measures are needed to ensure their wellbeing.

2.3 The Standard Requirements of EN 81-20 for Traction Elevators

The definition as written in EN 81-20:2020 states that rescue operations are actions required to safely release persons entrapped in the car and shaft by competent persons. Unfortunately, concerning the rescue requirements, the standard is not so clear; the coverage is limited and the content is spread in a multitude of subclauses. The most relevant requirements are listed in Table 2. Hydraulic elevators were not considered.

Clause	Summary of the requirement
0.4.9	The possibility of two simultaneous acts is not considered
3.46	Rescue operations are actions required to safely release persons entrapped in the car by competent persons
5.2.3	A door to the shaft at every 11 m or adjacent cars must be fitted with an emergency door.
5.2.5.3.2	There shall be a vertical surface below each landing door sill that is at least half the unlocking zone plus 50 mm and whose width is at least the car door plus 25 mm on both sides.
5.2.6.2.3	Rescue instructions shall be provided in the machine room or the machinery cabinet.
5.2.6.6.2	The emergency operations panel shall provide direct observation of the elevator machine or display the direction of movements of the car and the reaching of an unlocking zone.
5.3.8.1	The unlocking zone shall not extend more than 0,20 m (or 0,35 m if mechanically operated car and landing doors operate simultaneously) the above and below the landing level.
5.3.9.3.1	It shall be possible to open then landing doors from the outside with the emergency unlocking key.
5.3.15.1	If the elevator is stalled in the unlocking zone (5.3.8.1), it shall be possible to open the car and landing door by hand with a force not greater than 300 N, from within the car or from the landing after the landing door has been unlocked with the emergency unlocking key.
5.3.15.3	It shall be possible, at least where the car is stopped within the distance defined in 5.6.7.5, to open the car door from the landing with emergency unlocking key or tools permanently available on site.
5.4.5.2	The height of the vertical portion of the car apron shall be at least 0,75 m.
5.4.6.1	The car roof emergency trap door is subject to negotiation with the customer, but it must have a minimum size of 0,40 m × 0,50 m.
5.4.6.2	In case of car emergency doors, the cars shall be provided with a means of determining the position of the adjacent car to allow the cars to be brought to the next to each other.
5.4.6.3	It must be possible to open the emergency doors and trap doors from outside without a key and from
	inside the car with a triangle key. The locking must be verified by an electric safety device, which in case of emergency doors shall also stop the adjacent elevator. Restoring the elevator to service can only occur after deliberate relocking.
5.4.9	The area of natural ventilation holes in the upper and lower part of the car shall be at least 1% of the car area.
5.4.10.4	Car emergency lighting shall be provided for at least 1 h.
5.6.2.1.4.2	Releasing of safety gear must be possible up to rated load by emergency operation or with procedures available on site.
5.6.7.5	Protection against unintended car movement must stop the car so that the step between landing and car is no greater than 1,2 m and there must remain at least 1,0 m gap between floor level and door frame. The opening to that shaft must not be greater than 0,2 m.
5.9.2.2.2.7	The machine shall have a brake release which is either manual or electrical with battery back-up.
5.9.2.2.2.8	Instruction and warnings shall be fixed near the brake release means
5.9.2.2.2.9	In case car and counterweight are not balanced, it shall be possible to move the car by manual or electrical (which are independent of mains supply) means (ref. 5.9.2.3.1). These means must be available on site.
5.9.2.3.1	The effort to move the car manually shall not exceed 150 N. The electrical means shall be capable of moving the car to the landing for 1 h.
5.9.2.3.2	During emergency operation it shall be possible to check when the car is at the unlocking zone.
5.9.2.3.3	If the effort to move the car with rated load upwards exceeds 400 N or if no manual means (acc. 5.9.2.3.1) is provided, then electrical means (acc. 5.12.1.6) shall be provided.
5.9.2.3.4	The emergency operation shall be actuated from the machine room or machinery cabinet.
5.9.2.3.5	If a manual winding wheel is provided for emergency operation, then the car movement direction must be clearly indicated near the winding wheel.
5.12.1.6	If electrical emergency operation means are required, then an emergency operation switch (acc. 5.11.2) shall be installed. The machine shall be supplied for main supply or standby supply if provided.
5.12.3.1	A remote alarm system in accordance with EN 81-28 shall be installed (see also 5.2.1.6) ensuring a two-way voice communication allowing permanent contact with a rescue service.
7.2.2	The instruction manual shall give information about the usage of the emergency unlocking key and how to release the brake, ascending car overspeed protections, unintended car movement protections and safety gears - including the identification of any special tools needed.
E.3.2	Considerations for the safety of passengers entrapped in a stalled elevator car.

Table 2: Summary of EN 81-20:2020 rescue requirements [6]

Based on the above, the following interpretations can be made for the rescue procedures:

- The primary rescue method is to drive the elevator to the unlocking zone using electrical emergency operation controls provided in the machine room or the machinery cabinet (5.9.2.3.4 and 5.2.6.6.2).
- If the primary rescue is not successful, there must be either a manual or electrical brake-release system that enables the car to move to the unlocking zone, unless there is a balanced load condition between car and counterweight. (5.9.2.2.2.7, 5.9.2.2.2.9, 5.9.2.3.2).

Implicitly, it can also be interpreted that:

- Rescue operations should be completed in 1 h, because the lighting in the car and power for the electrical means to move the car to landing have to work for that time.
- Two or more independent faults leading to rescue do not need to be considered (unless otherwise specified).

In addition, the standard provides requirements for conditions where the primary and secondary rescue procedure fail:

- Adjacent cars must have an emergency door if there is more than 11 m between shaft doors (5.2.3).
- It must be possible to open the car door from outside when the car is outside the unlocking zone (5.3.15.3).
- Apron extension is there to provide protection when rescuing passengers when the car is not directly on the landing (5.4.5.2).
- The release of safety gear must be possible with procedures available on site (5.6.2.1.4.2).
- The minimum size of the car roof emergency trap door is 0.40 m X 0.50 m – if provided.

What the standard does not really specify is:

- For which contingency the above-mentioned additional requirements are planned
- The responsibility of the elevator technicians in executing rescue in these situations
- Which solutions are applicable as the back-up power supply, e.g., in 5.9.2.3.1 b) 1).

2.4 Other Standards and Regulations

The North American ASME A17.1/CSA B44 does not offer much more guidance, but it has a few clear distinctions to EN 81-20:2020: a car roof emergency trap door must normally always be provided (2.14.1.5), car emergency doors are prohibited (2.14.1.10), forced ventilation with 1-h auxiliary power is required for observation elevators exposed to sunlight (2.14.2.3.3) and backup power needs to be provided for car lights and two-way communication for at least 4 h. Requirements are also given on testing back-up power (8.6.4.19.7) and the training and availability of rescue procedures (8.6.11.5).[7]

In addition, ASME has published a Guide for Emergency Personnel (ASME A17.4). In extension to what has already been discussed, it recommends that release of passengers from elevator cars is performed under the supervision of elevator

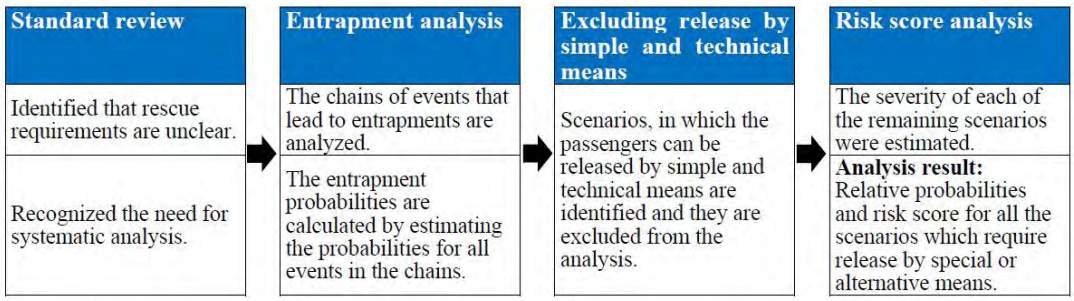

Figure 2: Overview of the analysis process. Release scenarios refer to entrapments combined with other factors relevant to passenger release operations.

personnel, and it defines how entrapped passengers are rescued in case the car is a maximum of 914 mm from the landing.[8]

In China, there are additional regulations concerning the release of passengers. The periodical inspection regulation according to TSG T7001-2009 includes testing of rescue procedures with balanced load.[9] According to Regulations on Safety Supervision of Special Equipment, if the passengers are trapped in the elevator car for more than 2 h, it is classified as an "Ordinary Accident."[9] So, it is commonly followed as a guideline that the rescue must be completed in 2 h. Another Time-related requirement is from TSG T5002-2017, which specifies that, after receiving information of trapped passengers, the arrival time of an elevator technician to the site shall not exceed 30 min in cities and 1 h in other areas.[10] Furthermore, TSG T7007-2022 requires so-called "additional braking means" to limit elevator speed in case the normal brakes fail. This can also increase safety when passengers are released by brake release.[12]

2.5 Roles and Competencies of Personnel Performing Rescue

In many cases, elevator technicians are the first to arrive at the site after receiving information from the remote alarm system. They should be competent in safely releasing passengers using simple and technical means, and it is in their interest to perform the release in a manner that causes minimum damage to elevator. However, challenges may emerge due to a large variety of equipment being in service and the pressure created by the situation.

In large buildings, there are often building management personnel on the location, and they may also be trained to perform simple release of passengers. Their training can focus on release methods needed specifically for the equipment in their facility, but their understanding of complex machinery may be limited and the staff turnover rate may be high. The scope of release procedures for which the building management is competent should be clearly set out and refresher training should be provided at least annually.[11]

Emergency services personnel are the only ones who are trained in rescue of people from heights and in intrusive rescue methods in case the car is permanently immobile. They are also the most competent to assess if passengers inside that car need assistance due to medical reasons. They focus on the quick and safe rescue of the passengers; possible material damages are less of a concern. This, together with possible unwanted attention created by the arrival of emergency services, can postpone their being called to a location. Also, emergency services personnel may not have in-depth knowledge of elevator systems. The rescue operation should always be done under the supervision of elevator personnel.[8,12]

It should be noted that, in larger emergencies such as earthquakes, the availability of any personnel beyond those who are already on-site may be restricted for extended periods of time.

3. The Systematic Analysis

As discussed, there is much lack of clarity regarding rescue requirements in the standards. Therefore, an analytical approach was created for assessing the probability and severity of different rescue scenarios or passenger release scenarios, as explained in Figure 2. The target was to create data for assessing what release by special means should cover, i.e., in which situations it is justified to have special tools and techniques for releasing passengers to the landing.

The scope of the analysis was the current high-rise elevator platform at KONE – elevators with a machine room, either traditional steel ropes or KONE UltraRope® as suspension means, reduced-stroke buffers and conventional overspeed governor safety systems.

Passenger-release scenarios were defined by considering not only reasons for entrapment, but also all the other technical aspects that affect release operations. Table 3 lists all the faults and conditions related to passenger-release scenarios. Here, "Faults"

Faults	(Several faults may apply simultaneously) • Car safety gear activation • Counterweight safety gear activation • Car buffer run • Counterweight buffer run
Conditions	Balance • Car side heavy • Counterweight side heavy • Balanced
	Machinery • Functional machinery during passenger release • Functional machinery but insufficient torque or friction • Machinery out of use during passenger release
	Possibility to move the car • Car movable • Car not movable

Table 3: Faults and conditions that make up passenger release scenarios

refer to activated safety systems stalling the elevator. All other factors affecting the elevator are referred to as "Conditions," meaning the car load, whether the elevator is operable and if anything else is hindering car movement.

The "Faults" category has several options that can appear on their own or as combinations, e.g., single- or double-safety gear activation, where the opposite side has activated due to inertia in the overspeed governor rope.

The balance situation in the elevator is not only dependent on the car load, but also on the car location in the shaft due to compensation unbalance. For simplicity and consistency with EN 81-20:2020, only the car load was used in this analysis.

The "Machinery" options describe if the elevator is operable: whether the main or back-up power supply is available, and the drive and machine are functional. In some cases, e.g., when both the car and counterweight safety gear are activated, the machinery could be functional but there is not enough torque and friction for moving the car. If the power supply, machine and drive control system were out of use but the traction sheave was free to rotate, this condition was marked as "Machinery out of use during passenger release."

The "Possibility to Move the Car" category is an umbrella term for atypical or not safety system related reasons for having a stalled elevator, such as a non-rotating traction sheave, entangled overspeed governor ropes and such.

Next, the probabilities of everything listed in Table 3 were estimated. Almost all of the events had to be broken down into more detailed chains of events for more precise estimates. The counterweight buffer run probability analysis is presented as an example case below.

Different variations and passenger release options for the counterweight buffer runs were identified (see Figure 3). The buffer runs were divided into two types — low- or high-impact speed — and further split according to safety gear activation on the opposite side due to overspeed governor rope inertia. Electrical emergency operations and brake release were possible in certain cases, as long as the safety gear was not activated on the car side. Releasing passengers to the landing was a possibility in all the categories, assuming the car was close enough. The used limits were based on EN81-20:2020 5.6.7.5. The focus in this analysis was on the situations where none of these methods were applicable.

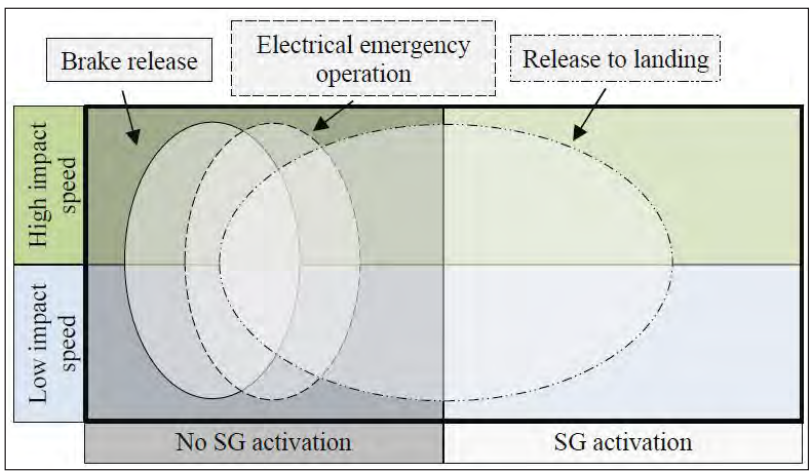

Figure 3: Breakdown of counterweight buffer runs according to impact speed and safety gear (SG) activation. The three ovals stand for release by simple and technical means, while the uncovered areas represent release by special or alternative means. The figure is for conceptual visualization only and is not in scale.while the uncovered areas represent release by special or alternative means. The figure is for conceptual visualization only and is not in scale.

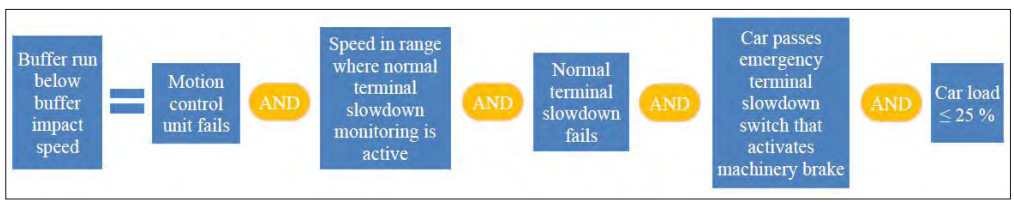

Figure 4: Chain of events leading to a counterweight buffer run below impact speed. The main factor differentiating from the high impact speed is the car load: A light car will have a shorter-than-dimensioned braking distance, and the counterweight will hit the buffer at a lower speed or even stop before the buffer.

Breaking down the buffer runs began by studying what needs to happen for the counterweight to hit the buffer in the first place. The chain of events leading to a buffer run below impact speed is described in Figure 4. The Fault Tree Analysis (FTA)[12] method was considered for building the chains of events, but a customized visualization was chosen instead.

The analysis was then continued with several additional aspects:

- How often does the counterweight approach the buffer, i.e., how often does the car drive to the highest floor?
- How often will the car jump and the car safety gear be activated due to rope inertia?
- How high can the car jump?
- How often will the machinery be functional after a buffer run?
- How often is the counterweight side heavier than the car side?
- What is the buffer stroke and how much of it is used?

Input values for the analysis were collected from EN 81-20, safety integrity levels defined in IEC 61508,[13] KONE statistics, simulation data and expert opinions.

Figure 5 presents how the three release methods from Figure 3 were defined so there is no overlap. The area of interest in this analysis is when none of the methods is applicable.

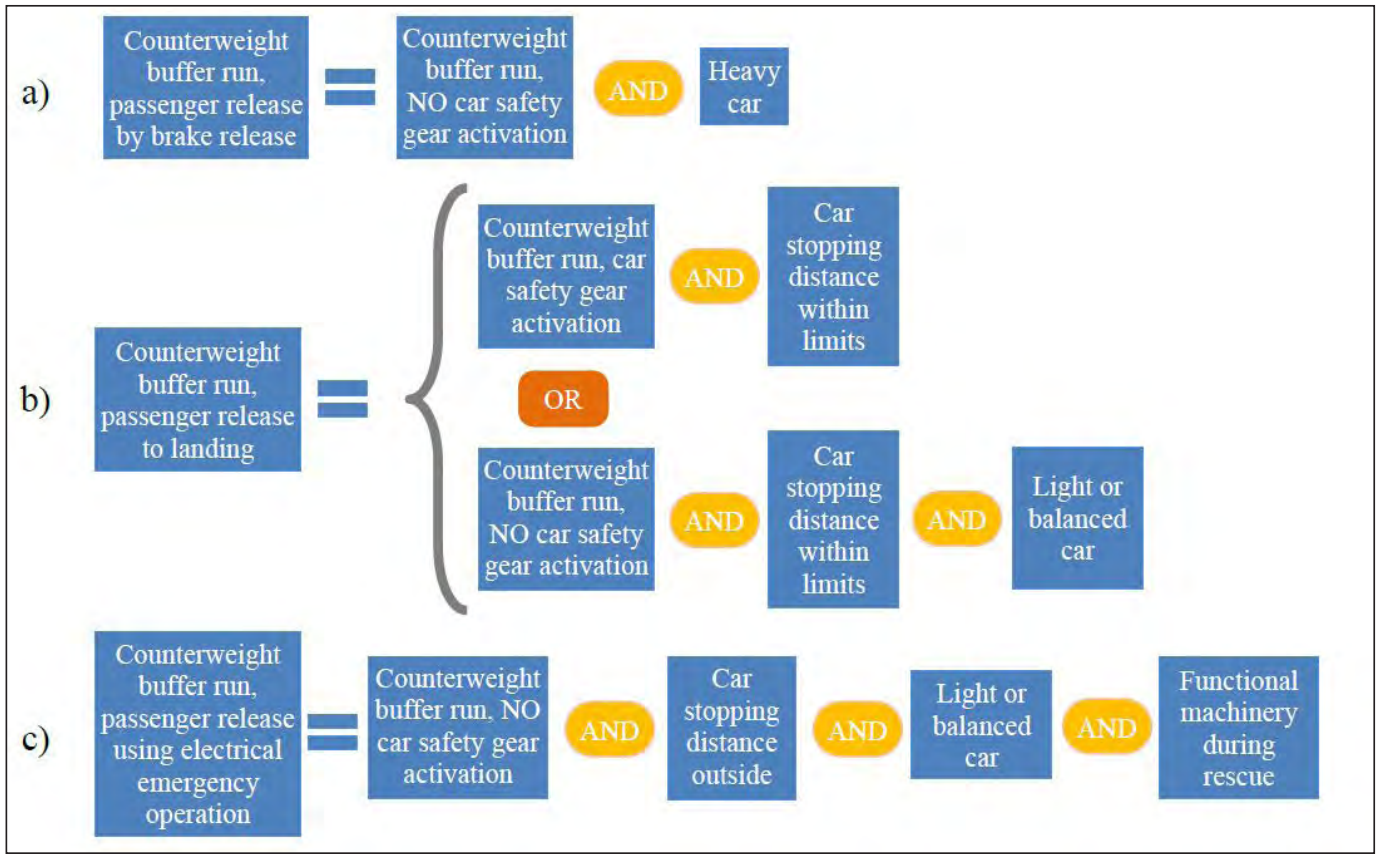

Figure 5: Chains of events, defined without overlapping, for passenger release after a counterweight buffer run through a) brake release, b) release of passengers to landing and c) using electrical emergency operation

The passenger release scenarios other than counterweight buffer runs were analyzed similarly, except the release of passengers to the landing was only considered possible with the buffer run cases, due to the typically long distances between landings in high-rise elevators. The assumption was conservative; in reality, there will be cases where releasing passengers to the landing will be, nonetheless, possible.

The total risk of each passenger release situation was estimated as a product of its probability and severity. In this case, the risk to be assessed was how dangerous release by alternative means was depending on the location of the stalled elevator. Passenger release operations inside the shaft were defined as a reference point. Passenger release operations in the pit were considered less dangerous, since there is access from the lowest landing to the car roof. The most severe cases were the passenger release operations in the headroom, since access from the top floor reaches only the bottom side of the car. The severities are listed in Table 4. Risk scores were assessed on product platform level data only, i.e., assuming typical elevator usage and typical distribution of counterweight overspeed governors, etc.

Figure 6 shows the probabilities and risk scores of the passenger release situations that require special means for moving the car to the unlocking zone or releasing by alternative means. The results are to be used only for comparison between cases. Therefore, the values have been omitted.

On the product platform level – the "high-rise population" data set – these situations were nearly equally likely for all three safety gear activation cases: car, counterweight or both, but notably less common for the buffer runs.

However, looking specifically at the elevators that have counterweight safety gear, there is a clear increase in double and counterweight side safety gear activations that are no longer covered by simple or technical means for passenger release. The same applies for the car buffer run cases.

In shuttle elevators, there are more counterweight buffer runs overall and a significantly higher number of them require release by special or alternative means. An emergency door in the headroom could be useful, especially for this type of elevator.

Case	Applies to	Severity
Passenger release operations in the shaft	Safety gear activations	100 %
Passenger release operations in the pit	Car buffer run	50 %
Passenger release operations in the headroom	Counterweight buffer run	200 %

Table 4: Severity values for release by alternative means in the different parts of the shaft

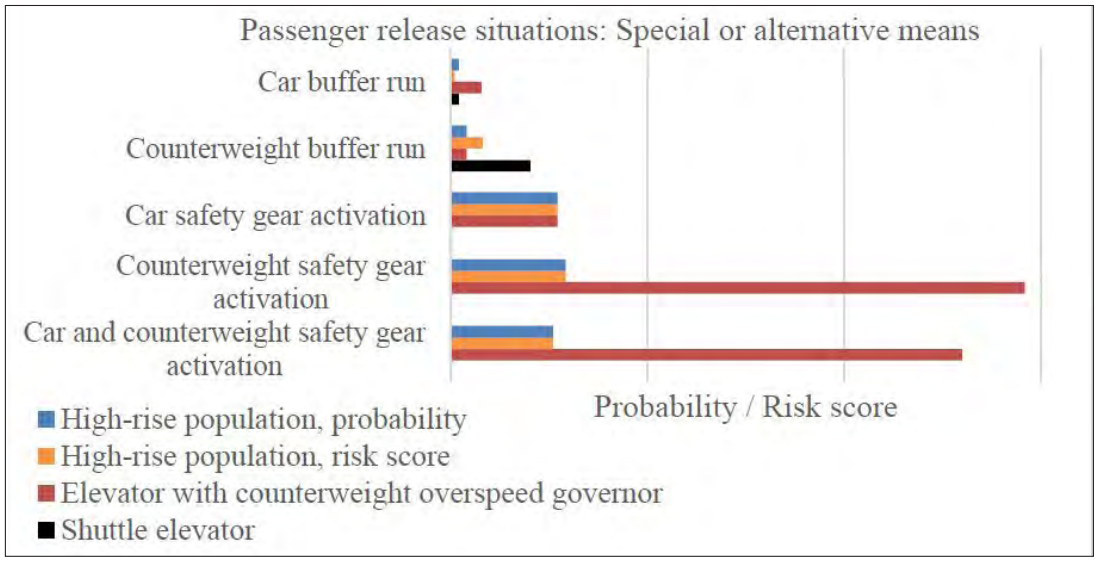

Figure 6: Relative probabilities and risk scores of passenger release situations that require either special or alternative means. The high-rise population assumes a typical set of high-rise elevators, with few shuttle-type elevators and counterweight safety gear in only part of the population. "Car not movable" cases are excluded, as well as release by simple or technical means.

There is a range of uncertainties and error sources in the approach, mainly because detailed data was not available for all inputs and expert opinions had to be used instead. There were also some assumptions and simplifications that were unconservative, i.e., not representing the worst-case scenario. For example, it was assumed that a safety gear activation could be released by simply releasing the brakes (assuming there is some unbalance), while, in reality, this may require some additional force.

A limited sensitivity analysis was done by variating some selected inputs. Ideally, this should be done on all inputs. It was also recognized that the original fault may directly impact the passenger release scenario, e.g., in case of machine bearing failure, the machine is automatically not available during release operations. These kind of cross dependencies could not be fully taken into consideration in the analysis.

4. Discussion

The target of the research was to identify the entrapments and conditions where there should be an easily applicable method for releasing passengers to the landing. A higher degree of preparation improves passenger safety, but getting ready for extremely rare events increases product costs. Complex methods may prove impractical in real situations. In exceptional cases, having passengers

first released by emergency services and repairing the system in due time may be a smart course of action. But, relying too much on emergency services may also be a weakness.

When it comes to releasing passengers from a stalled elevator, the EN 81-20:2020 standard is, unfortunately, not very clear. The problem has become more acute due to the introduction of new elevator solutions, in particular for high-rise applications with heavy masses and long distances between landings. Also, the terminology lacks needed precision.

Since the elevator standard did not offer adequate guidelines for determining requirements for the release of passengers, an analytical approach was introduced for evaluating the different scenarios.

Analyzing elevator fault situations analytically proved to be a useful tool in estimating the scope of different passenger release methods. For instance, it brought up the need to more clearly define a safe release principle of passengers to the landing in case the car is stuck close to the unlocking zone and demonstrated the benefit of having an emergency door to the headroom in high-speed shuttle elevators. It also emphasized the importance of a reliable back-up power solution.

Assessing how several events or factors affect each other is in contrast with the EN 81-20:2020 approach, which only covers single faults. The holistic view raises, for instance, the question of whether electrical emergency operation can be used during release operations. Can the machinery and drive be assumed to be functional when a fault has caused an entrapment in the elevator? And what is the standard's take on safety gear activations caused by overspeed governor rope inertia in terms of rescue operations?

A similar, analytical approach could be used in the future for defining rescue requirements in elevator safety standards.

Finally, extensive reflection of special means for releasing passengers to the landing has led to the realization that one hour may not be adequate to apply such means.[15] The requirements for car emergency lighting and two-way voice communication should be extended. Also, a battery-operated car fan would make conditions in the car more tolerable. For the same reason, local modifications to car interiors, which may affect car ventilation, should be considered as part of the elevator safety inspection.

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Elevators and the Environment

by Fernando Guillemi and Alea Guillemi

This paper was presented at the 2022 International Elevator & Escalator Symposium in Barcelona, Spain.

Abstract

The concern about environmental degradation is growing by the day. The UN says this is a key year to try to curb the "disastrous" effects of climate change and urges countries to act now to achieve zero emissions by 2050. Environmental degradation is defined as the process of deterioration suffered by the environment as a result of the depletion of its natural resources due to the overexploitation to which they are subjected, thus causing the destruction of ecosystems and their biodiversity.

Several of the activities carried out by human beings are linked to this degradation: in our case, industrial activity. Although we create a large number of jobs, that is one of the factors that creates the greatest negative impact on the environment. We generate large amounts of waste of all kinds, polluting the soil, the water and the atmosphere. We need to burn fossil fuels to generate energy, and some wastes are highly hazardous, which can cause a major environmental disaster in the event of an accident. From our sector, we must assume the commitment to care for future generations, and we have a lot to contribute if we take the right approach to the problem.

Elevators consume between 3% and 4% of the energy, out of a total of 14 million elevators installed worldwide. But perhaps that is not the right perspective to address the problem in which our sector negatively influences the environment. In this presentation, we will take a different approach. We are convinced that this is the right way to do our bit and slow down environmental degradation.

Introduction

Is the biggest carbon footprint generated by the elevator sector due to the use of the elevator or to maintenance, lubrication and inspection service when moving with a vehicle that consumes hydrocarbons? Should we be concerned about only the carbon footprint, or could it also be that we should eliminate as much as possible the pollution produced by some types of elevators? Could we do something to improve human resource efficiency and the sustainable manufacturing of equipment?

This paper will answer each of these questions and propose solutions to them. We will analyze how the negative influence on the environment can be reduced in each of the processes that we carry out in our companies from the moment we establish contact with a customer, to the salesperson's assistance, the quotation, the sale, the project, the purchases, the manufacturing, the installation and the maintenance.

For us, the key points to answer these questions are the use of human resources, the choice of low-polluting equipment, the supplies and components used, the manufacturing methods and maintenance. All of them will be evaluated by making an analogy with the

equivalent carbon footprint. In this way, we will be able to have an effective correspondence of the influence of each one of the processes in the ecological affectation of our environment, in order to draw true conclusions. We will analyze where and how, in the whole process, the environment is most affected, and then propose alternatives to mitigate the problem by making our contribution from the sector.

Development

We have seen many papers on energy efficiency in elevators, all based on how to decrease energy consumption. Much has been achieved recently. For example: the reduction of consumption when the elevator is in standby, LED lamps, inverters that stop consuming energy, position indicators that lower their intensity, automatic shutdown of lighting and fans, etc. But we forgot other aspects of the elevator equipment that were not taken into account. For example: pollution either by carbon dioxide emission or oil and grease spillage.

Later we will also address energy savings through efficient management of human resources and manufacturing systems. Now we would like to point out the two most important factors to consider in order to collaborate with the environment.

1. Carbon Dioxide Pollution

In Argentina and perhaps in most of the western world, the typology of buildings is generally low rise and requires elevators with a relatively low load, six-to-eight-person capacity and moderate speeds. If we evaluate it according to the UNE-EN ISO 25745-2 standard:

- Elevators would be of a category of use between 2 (low) to 3 (medium) with an average of 200 starts per day. (Table 1)
- The average travel distance would be 49%. (Table 2)
- The nominal load percentage Q is 7.5%. (Table 3)

For this equipment, which is generally installed in residential buildings, the elevators are designed for loads of 450 to 600 kg and speeds of 1 m/s. The motors have power ratings of no more than 4.2 kW. They operate for 1.2 h per day with very low standby consumption and do not exceed 5 kWh per day. It is evident that having reduced standby consumption so much, during the remaining 22.8 h, we observe that the equipment does not generate a large carbon footprint.

If we take, for example, the numbers of the Argentine energy matrix, composed of thermal, hydraulic, atomic

Categoría de uso	1	2	3	4	5	6
Intensidad/frecuencia de uso	Muy bajo	Bajo	Medio	Alto	Muy alto	Extremadamente alto
Número de viajes por día (n_d) (rango típico)	50 (< 75)	125 (75 a < 200)	300 (200 a < 500)	750 (500 a < 1 000)	1 500 (1 000 a < 2 000)	2 550 (≥ 2 000)

Table I

Categoría de uso	1-3	4	5	6
Número de paradas	Porcentaje de la distancia de recorrido media			
2	100%			
3	67%			
> 3	49%	44%	39%	32%

Table II

Categoría de uso	1-3	4	5	6
Carga nominal (kg)	Porcentaje de la carga nominal (Q)			
≤ 800	7,5%	9,0%	13%	19%
801 a ≤ 1 275	4,5%	6,0%	8,2%	13,5%
1 276 a ≤ 2 000	3,0%	3,5%	5,0%	9,0%
>2 000	2,0%	2,2%	3,0%	6,0%

Table III

and some renewable energy, it has a ratio of kilos of CO2 produced for each kWh of 0.5. Therefore, the carbon footprint per equipment consumption is only 2.5 kg of CO2 per day. According to statistics regarding the fuel consumption of our vehicles, to carry out the monthly tasks for elevators with claims, inspections, monthly lubrication, emergencies, audits of technical representatives, etc., they consume an average of 300 l of diesel per month each, which is equivalent to an average of 15 l per working day.

These work teams in cities such as Buenos Aires can only attend an average of four elevators per day. Therefore, we can

estimate, in order to make a comparison and relate the different carbon footprints, that each elevator uses 3.75 l of diesel tobe attended by our personnel and only to respond to claims. We would also have to take into account the lubricating equipmentand the inspection vehicle. Therefore, we will average the result by multiplying it by two, since not all elevators have failures every month.

Now, to convert 3.75 l of diesel into CO2 emissions, we must make a series of calculations. To do this, we turned to chemical technicians who gave us a hand: One liter of diesel weighs about 850 g. It is composed, among other substances, of 85% carbon, which means that in a liter of diesel there are 722.5 g of carbon; the atomic weight of carbon is 12. To form CO2 in the combustion, two atoms of oxygen are used for each one of carbon; and as the atomic weight of oxygen is 16, doing some simple math. It turns out that 1,927 g of oxygen are needed in the combustion. Adding the 722.5 g of carbon plus the 1927 g of oxygen, we get that, as a product of the combustion of 1 l of diesel, 2,649 g of CO2 are emitted. (Annex 1)

Each vehicle per day per elevator emits: 2.65 kg CO2 x 3.75 l, an equivalent of 10 kg, two vehicles 20 kg of CO2 against 2.5 kg of CO2 caused by the elevator for the consumption of electric energy from the grid. We are not counting the energy savings due to regeneration when the motor behaves as a dynamo or the injection of other types of energy such as that produced by photovoltaic cells.

In any case, the conclusion is obvious: our after-sales service pollutes eight times more than the elevator itself.

2. Contamination by Oil Spills

The second most important contaminant in elevators is hydraulic oil. According to international organizations, each liter dumped into sewers contaminates 1.000.000 l of water.

Hydraulic elevators are a real time bomb. They are installed by the hundreds of thousands, and each one has no less than 200 l of mineral oil in their tanks and cylinders. Many of them are buried, and we cannot know the condition of the liners that contain them.

In addition, cylinder and pump unit manufacturers recommend changing the oil every 10 years. It is unknown what is done with the hundreds of thousands of liters of oil that are moved and replaced every year.

Hydraulic equipment not only has this serious problem of oil contamination but also high inefficiency since the pump requires a high-powered motor to lift the entire load, but also consumes the same energy whether it is running slow or fast, or whether it is carrying a large or small load. This is because the operation is based on a hydraulic circuit that, depending on the need, has valves that redirect the oil flow to the cylinder or to the reservoir tank because the speed regulation is done hydraulically.

In addition, although when the elevator descends it does not use energy from the power grid because it takes advantage of the

potential energy of the ascent, this potential energy is transformed into heat in the oil when it finishes its downward ride. This effect does not allow it to recover energy as gearless equipment can, but in addition, in the event of heavy use, an oil cooling system must be added to the installation. This is of significant importance since the heating of the oil causes changes in its viscosity, which results in poor leveling of the floors and a high loss of oil lifespan.

As a counterpart to the heating of the oil due to high frequency of use, a problem of cooling of the fluid is generated by low temperatures and little use, causing a viscosity change effect also with the consequences mentioned in the previous paragraph. Of course, manufacturers have worked to solve all these problems: They have designed electronic valves, installed inverters, developed biodegradable fluids, etc., but it has not yet been seen much in the market due to its high cost.

So, why use hydraulic equipment instead of machine-room-less (MRL) equipment? Because of its ease of transmitting efforts to the pit? An MRL does this. Because of the possibility of battery-operated descent? MR equipment not only descends on battery power, but it can also make several rides. Or is it because they can be accessed from three sides and take up very little space on a single shaft wall?

Well, it is time to present our development. An equipment MRL, which uses belts, occupies a single wall and requires the necessary space smaller than that of a hydraulic equipment; and the most important thing is that it is super friendly to the environment.

MRLBELT

Product

To design our product, we established the following objectives:

- Low maintenance and claims requirements
- Longer service life of the elements
- Light and efficient machine
- Durable and less polluting components
- Easier and faster installation, systematization of the installation
- Industrialization of the equipment; Kanban system
- No need for lubricant or oil, or any other polluting product
- Easy adaptation for modernization of environmentally unfriendly equipment

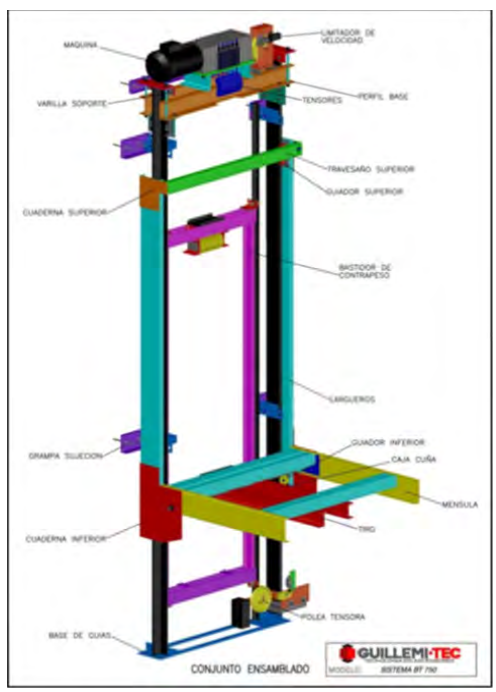
Therefore, we first started to search and study the different elevator traction belts in the world and the best machine to drive it. This is how we found a belt design that seemed to us to be very innovative and with qualities that surpassed the rest.

This belt has a design with grooves on both sides, which allows it to adjust well to both the traction sheave and the deflection pulleys. It does not slide to the sides, avoiding friction with the separators. In addition, having grooves on both sides works the surface of both sides.

Attached are its characteristics and tests.

Drawing and Characteristics

Thickness measurement test in 10 million operations (See Annex 2, 3 and 4). Electrical resistance and thickness measurement test in 60,000 cycles in an experimental elevator (see Annex 5). The machine to which this belt is adapted is of compact design, with encoder type Heidenhain ERN1387, double reel disc brake and certified for involuntary movement.



Machine

Testing of machine coupling at different frequencies and cycles of use (see Annex 6 and 7). Uncontrolled movement brake certificate (see Annex 8). With the basis of our suspension and traction element, we started looking for guides for the cantilever and the counterweight. We chose to use roller guides for both as it would allow us to have less frictional resistance, and we would not need grease or oil for operation.

Getting the guides for the counterweight was easy, but in the case of the cantilever, we had to go back to researching what we could find in the world. This is how we decided to install double wheel guides with an intermediate pivot — a great find. As regards the parachute, we chose a conventional progressive one.

Car and Counterweight Rollers

Having all the components, we started the design of our cantilever together with Aeronautical Engineer in Engineering Elvio A. Heidenreich, PhD. We made all the resistance tests of both the cantilever and the machine base by means of the finite element method.

Finally, to complement the equipment and to be able to industrialize it, we contacted Wittur Argentina, and together we designed the complementary elements and the manufacturing systematization, using the Kanban system. Today, we can say that the equipment is produced with high manufacturing quality and express delivery.

Human Resources

For several years, we have been working on a management and control system for the entire company's operations regarding the complete cycle from sales to after-sales. During the 2020 pandemic, we accelerated our plans, and today we can say that this program is 90% implemented.

We estimate that we have reduced the carbon footprint caused by administrative human resources by 50%. Nowadays, salespeople, administrative staff, designers and technical representatives perform their tasks in half of their working time, and have the other half to dedicate to other activities.

Just in One Click

New Equipment

Configurator	Budgeter	Contract	PO Automatization	Kanban / Project Activation	
Automatic Civil Project System where only the variables of the equipment are entered and the engineering project is automatically generated with the best technical alternatives and guide calculations. **User:** Commercial Agent **Savings:** Time, Gasoline, Money. **Benefits:** Decreases margin of error, time for new projects	Budgeting System. It only requires the minimum characteristics (technical data and stops) **User:** Commercial Agent **Savings:** Time, Gasoline, Money **Benefits:** Decreases margin of error and time for new projects.	Automatic generation of the contract based on what was entered in the budgeter with automatic mailing and digital signature. **User:** Commercial Agent, Client and Administrative Staff **Savings:** Time, Gasoline, Money, Paper **Benefits:** Decreases margin of error	Automatic generation of the PO with automatic mailing to the supplier. **User:** Automatic Management **Saving:** Time. **Benefits:** Decreases margin of error	Automatic generation of the e-mail to the supplier with the final engineering project attached for the activation of the assembly of the elevator kit and delivery in 15 days. **User:** Automatic Management **Saving:** Time. **Benefits:** Decreases margin of error, elevator produced 2 times faster	**Registration of the installation and follow-up of the stages.** **User:** Responsible of the Project, Purchases and Payment to Suppliers **Savings:** Management **Benefits:** Better control of work progress and payments to assemblers.

New Maintenance

Savings

Administrative labor savings:

- 280% more quotations done
- 192% more contracts
- 63% time savings
- 98% error savings due to mistyping
- 50% WH reduction due to the increase in productivity

Kanban savings:

- 8% annual productivity increase
- 96% scrap saving thanks to nesting

Savings by Digitizing Documentation: (engineering plans, works and maintenance budgets, signing contracts, work orders, purchase orders, payment orders, reports, etc.)

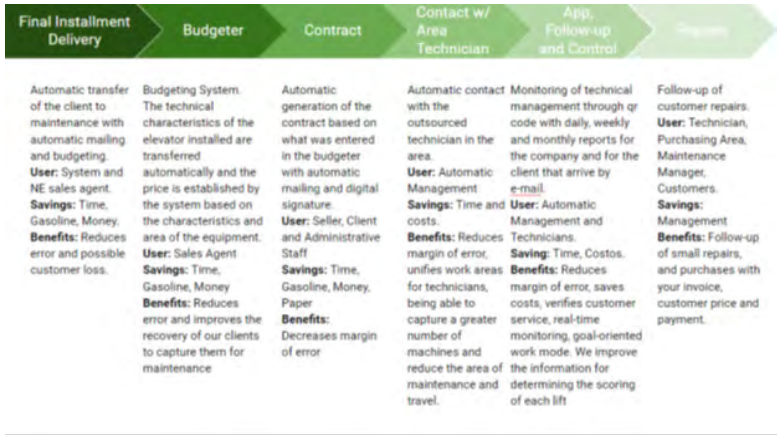
Digitalization savings

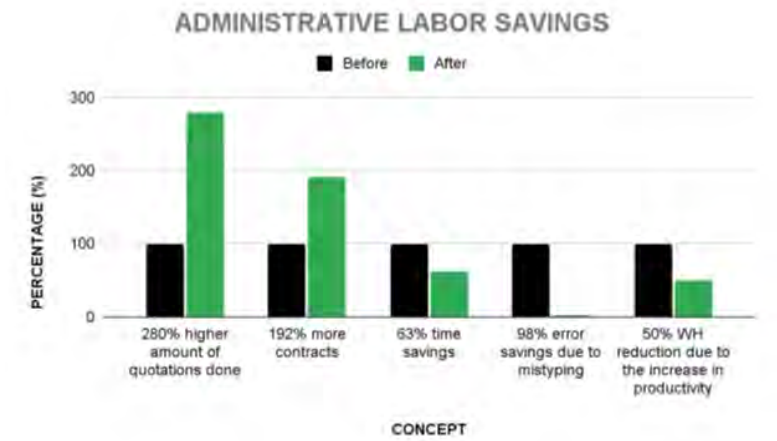
Conclusions

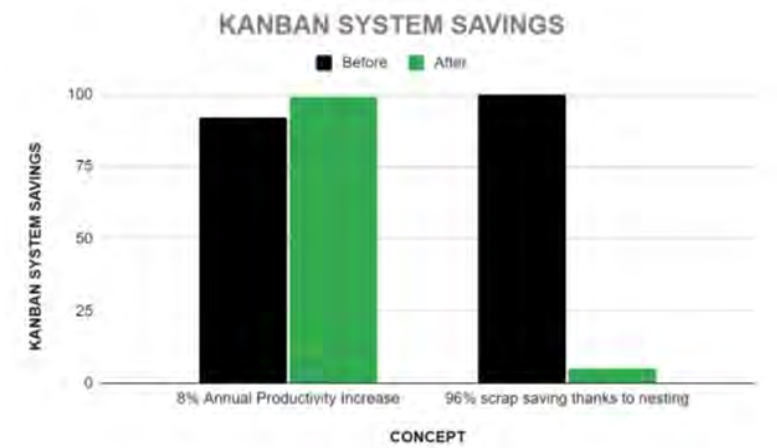
It is necessary to design and produce elevators with a low level of claim for damages, minimum maintenance, low polluting materials, adaptability to different shafts and suitability for mass-production. For all these reasons, it is imperative to use suspension means of the belt type with a much longer service life and safe monitoring compared to traditional traction cables, and the advantage of being able to use very small traction and deflection pulleys.

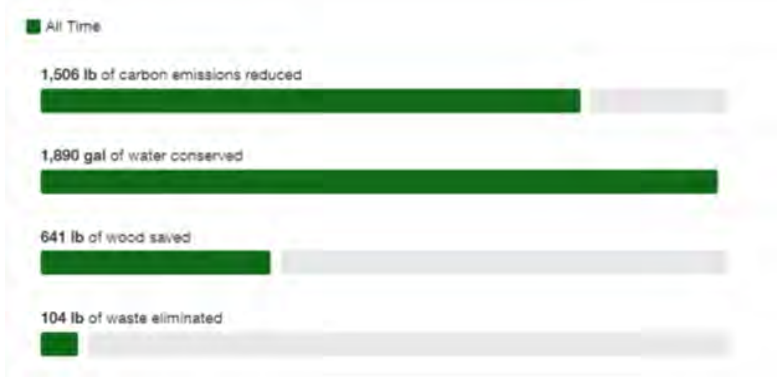
These traction belts allow us to use permanent magnet machines of light structure that facilitate installation, shorten installation time to one-third and require minimum space in the shaft, avoiding larger constructions with the consequent contribution to the environment by not requiring important concrete structures as it is a self-supporting system without a machine room.Another fundamental issue demonstrated in the presentation is the importance of not using grease and oils to avoid thegreasing of guides and lubrication of components. A great contribution to the environment, the system provides cleanliness in the shaft and minimum maintenance.

Hydraulic equipment should be adapted to new technologies so that they are environmentally friendly and do not jeopardize the future of the next generations. Those using hydrocarbon-derived oils should









be banned; biodegradable fluids and more efficient systems must be developed to save energy.

We had great intelligence to build this civilization. Let's use it now to save it.

ANNEX 1

Diesel Combustion

DIESEL DENSITY: 850 gr/lt.

DODECANE MOLECULE: C12H26

MOLAR WEIGHT:

- H: 1 gr/mole
- C: 12 gr/mole
- O: 16 gr/mole

Stoichiometry:

C12H26 + O2 → CO2 + H20

Equivalence: C12H26 + 37/2(O2) → 12CO2 + 13H20

Since we cannot divide the oxygen atom in two, we have to multiply the rest of the elements and the final formula would be:

2(C12H26) + 37(O2) → 24CO2 + 26H20

2(C12H26) → 850 gr

Now we need to calculate the molar weight:

2(C12H26) = 2(144 gr/mole + 26 gr/mole) = 340 gr/mole

24(CO2) = 24(12 gr/mole + 32 gr/mole) = 1056 gr/mole

CO_2 Emission Per Diesel Liter

To calculate the equivalent in grams of CO2 emitted, the formula would be:

850 gr _____ 340 gr/mole

X _____ 1056 gr/mole

X= (1056 gr/mole * 850 gr)/340 gr/mole = 2640 gr = 2,64 kg of CO2 emitted per liter of diesel.

CO_2 Emission Per Day from Maintenance Vehicles

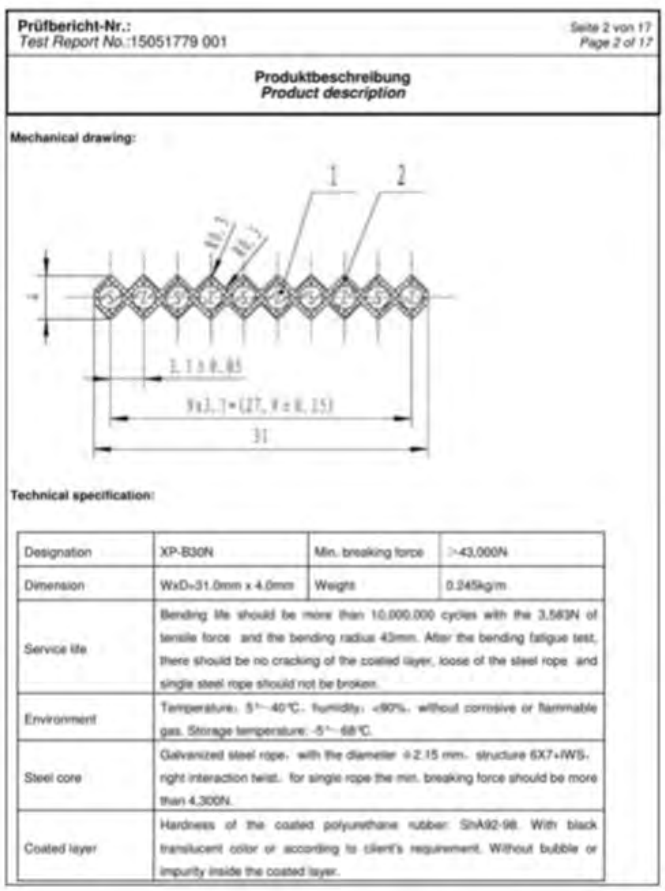
*This analysis is carried out on page 2 where we develop the carbon dioxide pollution from an elevator vs. the one of the vehicles that maintains them.

1 elevator consumes 3.75 l/day (from one car)

1 elevator needs at least two visits per month

CALCULUS = 2.64 kg/l emitted * 3.75 l/vehicles/elevator * 2 vehicles/elevator = 20 kg of CO2 emitted per day from our vehicles assigned to the elevators.

ANNEX 2



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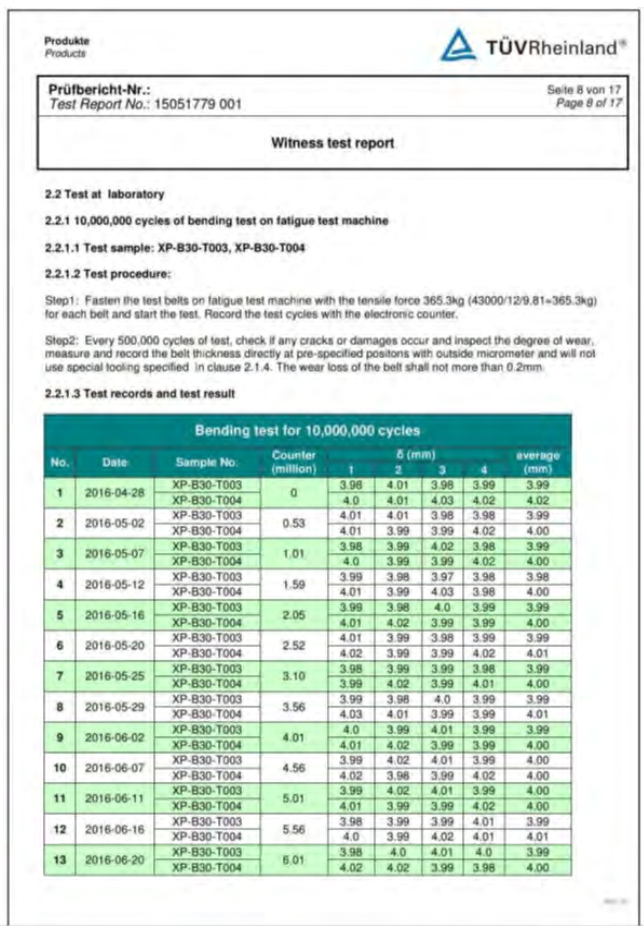
Produktbeschreibung / Product description

Mechanical drawing:

Technical specification:

Designation	XP-B30N	Min. breaking force	≥43,000N
Dimension	WxD=31.0mm x 4.0mm	Weight	0.245kg/m
Service life	Bending life should be more than 10,000,000 cycles with the 3.563N of tensile force and the bending radius 43mm. After the bending fatigue test, there should be no cracking of the coated layer, loose of the steel rope and single steel rope should not be broken.		
Environment	Temperature: 5°~40°C; humidity: <90%, without corrosive or flammable gas. Storage temperature: -5°~68°C.		
Steel core	Galvanized steel rope, with the diameter ø2.15 mm, structure 6X7+IWS, right interaction twist, for single rope the min. breaking force should be more than 4,300N.		
Coated layer	Hardness of the coated polyurethane rubber: ShA92-98. With black translucent color or according to client's requirement. Without bubble or impurity inside the coated layer.		

ANNEX 3



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Witness test report

2.2 Test at laboratory

2.2.1 10,000,000 cycles of bending test on fatigue test machine

2.2.1.1 Test sample: XP-B30-T003, XP-B30-T004

2.2.1.2 Test procedure:

Step1: Fasten the test belts on fatigue test machine with the tensile force 365.3kg (43000/12/9.81=365.3kg) for each belt and start the test. Record the test cycles with the electronic counter.

Step2: Every 500,000 cycles of test, check if any cracks or damages occur and inspect the degree of wear, measure and record the belt thickness directly at pre-specified positons with outside micrometer and will not use special tooling specified in clause 2.1.4. The wear loss of the belt shall not more than 0.2mm.

2.2.1.3 Test records and test result

Bending test for 10,000,000 cycles

No.	Date	Sample No.	Counter (million)	δ (mm) 1	2	3	4	average (mm)
1	2016-04-28	XP-B30-T003	0	3.98	4.01	3.98	3.99	3.99
		XP-B30-T004		4.0	4.01	4.03	4.02	4.02
2	2016-05-02	XP-B30-T003	0.53	4.01	4.01	3.98	3.98	3.99
		XP-B30-T004		4.01	3.99	3.99	4.02	4.00
3	2016-05-07	XP-B30-T003	1.01	3.98	3.99	4.02	3.98	3.99
		XP-B30-T004		4.0	3.99	3.99	4.02	4.00
4	2016-05-12	XP-B30-T003	1.59	3.99	3.98	3.97	3.98	3.98
		XP-B30-T004		4.01	3.99	4.03	3.98	4.00
5	2016-05-16	XP-B30-T003	2.05	3.99	3.98	4.0	3.99	3.99
		XP-B30-T004		4.01	4.02	3.99	3.99	4.00
6	2016-05-20	XP-B30-T003	2.52	4.01	3.99	3.98	3.99	3.99
		XP-B30-T004		4.02	3.99	3.99	4.02	4.01
7	2016-05-25	XP-B30-T003	3.10	3.98	3.99	3.99	3.98	3.99
		XP-B30-T004		3.99	4.02	3.99	4.01	4.00
8	2016-05-29	XP-B30-T003	3.56	3.99	3.98	4.0	3.99	3.99
		XP-B30-T004		4.03	4.01	3.99	3.99	4.01
9	2016-06-02	XP-B30-T003	4.01	4.0	3.99	4.01	3.99	3.99
		XP-B30-T004		4.01	4.02	3.99	3.99	4.00
10	2016-06-07	XP-B30-T003	4.56	3.99	4.02	4.01	3.99	4.00
		XP-B30-T004		4.02	3.98	3.99	4.02	4.00
11	2016-06-11	XP-B30-T003	5.01	3.99	4.02	4.01	3.99	4.00
		XP-B30-T004		4.01	3.99	3.99	4.02	4.00
12	2016-06-16	XP-B30-T003	5.56	3.98	3.99	3.99	4.01	3.99
		XP-B30-T004		4.0	3.99	4.02	4.01	4.01
13	2016-06-20	XP-B30-T003	6.01	3.98	4.0	4.01	4.0	3.99
		XP-B30-T004		4.02	4.02	3.99	3.98	4.00

ANNEX 4

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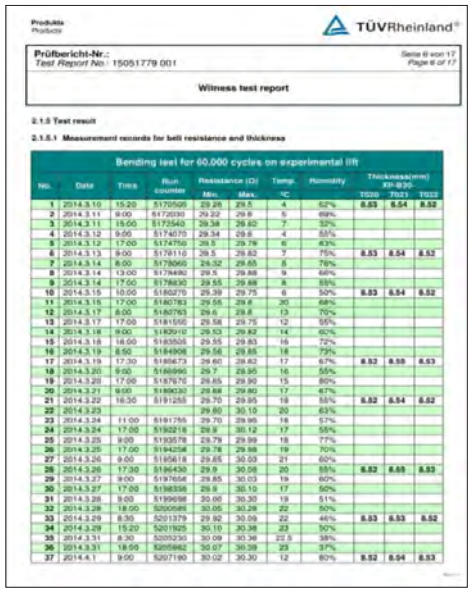
Witness test report

14	2016-06-25	XP-B30-T003	6.56	3.98	4.01	3.99	3.99	3.99
		XP-B30-T004		4.02	3.99	3.99	4.0	4.00
15	2016-06-29	XP-B30-T003	7.01	4.02	4.02	3.98	3.99	4.01
		XP-B30-T004		4.03	4.0	3.99	4.0	4.01
16	2016-07-04	XP-B30-T003	7.57	3.99	4.02	4.03	4.0	4.01
		XP-B30-T004		4.03	4.02	4.03	4.0	4.02
17	2016-07-08	XP-B30-T003	8.01	3.99	4.02	4.0	3.99	4.00
		XP-B30-T004		4.03	4.05	4.02	4.01	4.02
18	2016-07-13	XP-B30-T003	8.57	4.03	4.01	3.99	3.99	4.01
		XP-B30-T004		4.05	4.01	4.0	4.05	4.02
19	2016-07-17	XP-B30-T003	9.01	3.99	4.02	4.01	4.0	4.01
		XP-B30-T004		4.02	4.05	4.0	4.02	4.02
20	2016-07-22	XP-B30-T003	9.57	4.02	3.99	4.0	4.01	4.01
		XP-B30-T004		4.05	4.03	4.0	4.02	4.02
21	2016-07-26	XP-B30-T003	10.005	3.99	4.02	4.02	4.03	4.01
		XP-B30-T004		4.03	4.05	4.01	4.05	4.03

The wear loss of the belt is not more than 0.2mm. Fulfils the requirement of the test outline. Pass.

2.2.1.4 Site pictures

ANNEX 5



Produkte / Products — TÜVRheinland®

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Witness test report

2.1.5 Test result

2.1.5.1 Measurement records for belt resistance and thickness

Bending test for 60,000 cycles on experimental lift

No.	Date	Time	Run counter	Resistance (Ω) Min.	Resistance (Ω) Max.	Temp. °C	Humidity	Thickness(mm) XP-B30- T020	T021	T022
1	2014.3.10	15:20	5170595	29.29	29.5	4	52%	8.53	8.54	8.52
2	2014.3.11	9:00	5172030	29.22	29.8	5	69%			
3	2014.3.11	15:00	5172540	29.34	29.82	7	32%			
4	2014.3.12	9:00	5174270	29.34	29.8	4	53%			
5	2014.3.12	17:00	5174750	29.5	29.79	6	83%			
6	2014.3.13	9:00	5176110	29.5	29.82	7	75%	8.53	8.54	8.52
7	2014.3.14	8:00	5178060	29.32	29.65	8	76%			
8	2014.3.14	13:00	5179480	29.5	29.88	9	68%			
9	2014.3.14	17:00	5178830	29.55	29.88	8	59%			
10	2014.3.15	10:00	5180270	29.39	29.75	6	50%	8.53	8.54	8.52
11	2014.3.15	17:00	5180783	29.55	29.8	20	68%			
12	2014.3.17	8:00	5180763	29.6	29.8	13	70%			
13	2014.3.17	17:00	5181550	29.58	29.75	12	55%			
14	2014.3.18	9:00	5183910	29.53	29.82	14	62%			
15	2014.3.18	16:00	5183505	29.55	29.83	16	72%			
16	2014.3.19	8:50	5184908	29.56	29.85	18	73%			
17	2014.3.19	17:30	5185673	29.60	29.82	17	67%	8.52	8.55	8.53
18	2014.3.20	9:00	5186990	29.7	29.95	16	55%			
19	2014.3.20	17:00	5187676	29.85	29.90	15	80%			
20	2014.3.21	9:00	5189030	29.88	29.80	17	67%			
21	2014.3.22	16:30	5191255	29.70	29.95	18	55%	8.52	8.54	8.52
22	2014.3.23			29.80	30.10	20	63%			
23	2014.3.24	11:00	5191765	29.70	29.95	18	57%			
24	2014.3.24	17:00	5192216	29.8	30.12	17	55%			
25	2014.3.25	9:00	5193578	29.79	29.99	18	77%			
26	2014.3.25	17:00	5194258	29.78	29.98	19	70%			
27	2014.3.26	9:00	5195618	29.85	30.03	21	60%			
28	2014.3.26	17:30	5196438	29.9	30.08	20	55%	8.52	8.55	8.53
29	2014.3.27	9:00	5197658	29.85	30.03	19	60%			
30	2014.3.27	17:00	5198358	29.9	30.10	17	50%			
31	2014.3.28	9:00	5199698	30.06	30.30	19	51%			
32	2014.3.28	18:00	5200585	30.05	30.28	22	50%			
33	2014.3.29	8:30	5201379	29.92	30.09	22	46%	8.53	8.53	8.52
34	2014.3.29	15:20	5201925	30.10	30.38	23	50%			
35	2014.3.31	8:30	5205230	30.09	30.36	22.5	38%			
36	2014.3.31	18:50	5205862	30.07	30.39	23	37%			
37	2014.4.1	9:00	5207190	30.02	30.30	12	80%	8.52	8.54	8.53

ANNEX 6

Produkte / Products — TÜVRheinland®

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Witness test report

38	2014.4.1	16:30	5207730	30.11	30.31	21	58%			
39	2014.4.2	9:00	5208820	30.01	30.27	21	58%			
40	2014.4.2	18:00	5209511	30.00	30.30	21	80%			
41	2014.4.3	8:30	5209598	29.79	29.96	20	84%			
42	2014.4.3	17:00	5210190	30.11	30.30	21	84%			
43	2014.4.4	8:30	5211240	29.95	30.18	20	54%	8.52	8.53	8.52
44	2014.4.4	19:00	5211971	29.95	30.21	20	54%			
45	2014.4.8	8:30	5217395	29.92	30.18	19	59%	8.52	8.53	8.51
46	2014.4.9	8:30	5218983	29.98	30.25	21	80%			
47	2014.4.10	8:30	5220556	29.97	30.22	24	58%			
48	2014.4.10	17:30	5221272	29.99	30.22	26	55%			
49	2014.4.11	8:30	illegible 5222195	29.95	30.20	23	53%	8.51	8.53	8.52
50	2014.4.12	18:00	illegible 5224205	29.98	30.22	25	illegible 80%			
51	2014.4.14	8:05	illegible 5226690	30.00	30.25	23	57%			
52	2014.4.15	8:06	illegible 5227930	30.01	30.24	22	58%	8.51	8.52	8.52
53	2014.4.15	18:00	illegible 5228965	30.03	30.27	23	59%			
54	2014.4.15	8:30	illegible 5229995	30.01	30.26	25	59%			
55	2014.4.15	18:00	illegible 5230650	30.02	30.28	25	62%	8.51	8.53	8.52

According to the measurement records, the wear loss of the belts were less than 0.20mm after 60,000 cycles of bending test, PASS.

2.1.5.2 Result for step3

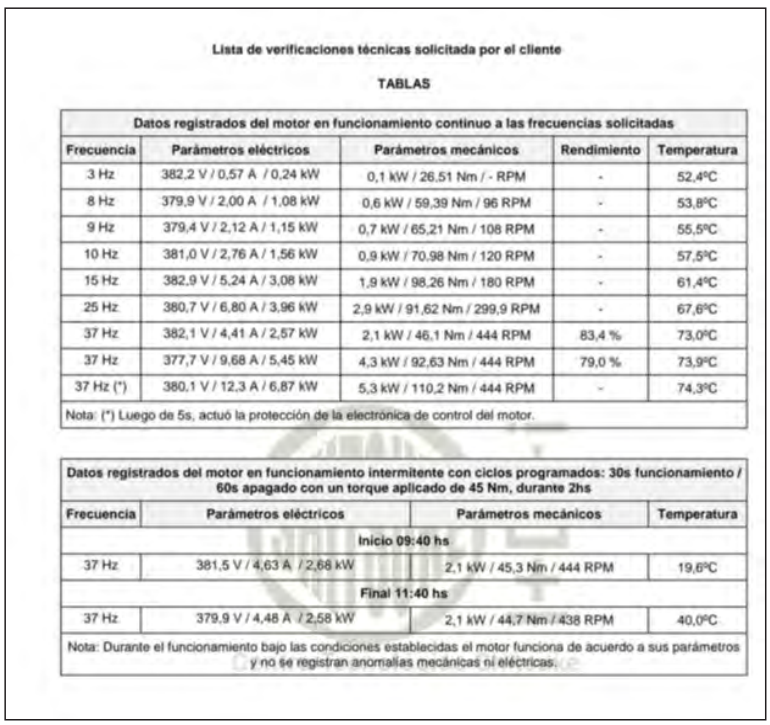
Site tested. The empty car cannot be raised when the counterweight is resting on the buffers, and the lift machine is rotated in the "up" direction. PASS.

2.1.5.3 Result for step4

Site tested. The brake operated automatically when the loss of main power and control power. PASS.

2.1.5.4 Site pictures:

ANNEX 7



Lista de verificaciones técnicas solicitada por el cliente

TABLAS

Datos registrados del motor en funcionamiento continuo a las frecuencias solicitadas				
Frecuencia	Parámetros eléctricos	Parámetros mecánicos	Rendimiento	Temperatura
3 Hz	382,2 V / 0,57 A / 0,24 kW	0,1 kW / 26,51 Nm / - RPM	-	52,4ºC
8 Hz	379,9 V / 2,00 A / 1,08 kW	0,6 kW / 59,39 Nm / 96 RPM	-	53,8ºC
9 Hz	379,4 V / 2,12 A / 1,15 kW	0,7 kW / 65,21 Nm / 108 RPM	-	55,5ºC
10 Hz	381,0 V / 2,76 A / 1,56 kW	0,9 kW / 70,98 Nm / 120 RPM	-	57,5ºC
15 Hz	382,9 V / 5,24 A / 3,08 kW	1,9 kW / 98,26 Nm / 180 RPM	-	61,4ºC
25 Hz	380,7 V / 6,80 A / 3,96 kW	2,9 kW / 91,62 Nm / 299,9 RPM	-	67,6ºC
37 Hz	382,1 V / 4,41 A / 2,57 kW	2,1 kW / 46,1 Nm / 444 RPM	83,4 %	73,0ºC
37 Hz	377,7 V / 9,68 A / 5,45 kW	4,3 kW / 92,63 Nm / 444 RPM	79,0 %	73,9ºC
37 Hz (*)	380,1 V / 12,3 A / 6,87 kW	5,3 kW / 110,2 Nm / 444 RPM	-	74,3ºC

Nota: (*) Luego de 5s, actuó la protección de la electrónica de control del motor.

Datos registrados del motor en funcionamiento intermitente con ciclos programados: 30s funcionamiento / 60s apagado con un torque aplicado de 45 Nm, durante 2hs			
Frecuencia	Parámetros eléctricos	Parámetros mecánicos	Temperatura
Inicio 09:40 hs			
37 Hz	381,5 V / 4,63 A / 2,68 kW	2,1 kW / 45,3 Nm / 444 RPM	19,6ºC
Final 11:40 hs			
37 Hz	379,9 V / 4,48 A / 2,58 kW	2,1 kW / 44,7 Nm / 438 RPM	40,0ºC

Nota: Durante el funcionamiento bajo las condiciones establecidas el motor funciona de acuerdo a sus parámetros y no se registran anomalías mecánicas ni eléctricas.

ANNEX 8

EURO CERT

EUROPEAN INSPECTION AND CERTIFICATION COMPANY S.A.

CERTIFICATE OF CONFORMITY TO TYPE WITH RANDOM CHECKING EUROPEAN LIFT DIRECTIVE 2014/33/EU ANNEX IX (MODULE C2)

Certificate Number:	SCMC2 0225
Certificate Expiry Date:	29/01/2020
Applicant/Certificate Holder (Name & Address):	Ningbo Guda Mechanical & Electrical Co., Ltd. / Block F, Xiangying Industrial Park, Yinzhou District, Ningbo, Zhejiang Province, P.R. China
Manufacturer (Name & Address):	Same as applicant
Date of Submission:	01/11/2018
Test Laboratory (Name & Address):	National Elevator Inspection and Testing Center / No. 61, Jinguang Avenue, Longfeng City, Hebei, P. R. China
Date and Number of Test Report:	28/06/2018 No. T14-F360-18-166 11/06/2018 No. T14-F350-18-066
Approved Type of Product:	Braking device as part of the Ascending Car Overspeed Protection (ACOP) means and Unintended Car Movement Protection (UCMP) means
Approved Model of Product:	XF
Directive (s) & Standard(s):	2014/33/EU, EN81-50:2014
Reference Standard(s):	EN81-20:2014
EU Type Examination Certificate (Module B) No.:	SCMB.0190

EUROCERT SA, aforementioned notified body with identification number 1128, ascertains and certifies that above safety component satisfy the safety requirements of the European Directive 2014/33/EU.
The manufacturer is authorized to provide the safety component described above with the CE Mark as displayed below:

CE 1128

Preconditions:
It is required that the above safety equipment must always come with a declaration of conformity and the relevant instructions of use.

Athens, 11/04/2019

INSPECTOR
CHAD WANG

FOR EUROCERT SA
Konstantinos Psychogios
Authorized Product and Laboratories Manager

Please check the validity of the certificate from our website using the password N68yZcdt

Inspections Cert No.: 53
AT.114/E17/16-01-2014

89 CHIOS STR. & IKOVRISEOS, 144 52 METAMORFOSI, ATHENS, GREECE
Tel.:++30 210 62.52.405, 30 210 62.53.927 - Fax: ++30 210 62.03.018
Internet site: www.eurocert.gr - e-mail: eurocert@otenet.gr

Biographical Information

Fernando Guillemi, founder and CEO of Guillemi Group, is known for his knowledge in aeronautical engineering. He is the former president of FACARA and CAFAC and part of the steering committees for CAA and ADIMRA — all of these organizations are Argentinian chambers related to elevators. He is a columnist for S&B Magazine and a member of GEA Group.

Alea Guillemi, CFO and strategy director for Guillemi Group, has a Master in Business Administration and is a part of ITEEA and on a committee for ADIMRA Youth.

Attendees listen to presentations.

Industry and University Unity in Iran

12th International Seminar on Elevators and Escalators

by Mohammad Masoud Majidifar

The 12th International Seminar on Elevators and Escalators was held with the cooperation of the University of Applied Science and Technology and Iran's union of elevator, escalator and affiliated services with the presence of academic staff and industrialists at the Koosha International Center of Applied Science and Technology in Iran on February 23.

The seminar was held with the presence of Dr. Pishbin, the manager of the University of Applied Science and Technology (Tehran Branch); Eng. Abbas Abrishami, the manager of Iran's union of elevator, escalator and affiliated services, experts, professors, industrialists; and a foreign guest.

After reading passages from the Quran and the national anthem, Dr. Sajadi, the educational deputy of Koosha College, thanked outstanding industrialists, professors, foreign guests and sponsors for their presence and declared that, for the 12th time, "We utilized elevator industry knowledge in order to achieve our goals, and, in tough economic circumstances, we respect our industrialists and professors.

Sajadi expressed that countries don't progress unless they increase wealth in their communities, and gaining

Industry leaders gathered for the 12th time.

wealth is due to the strong relationship between industry and university. She added the seminar secretariat had received 22 articles and also the experts' panel on "the investigation of the quality record of domestically manufactured parts in competition with imported parts and future strategies" is being held for the second time in Iran.

During the opening ceremony, Pishbin mentioned the weakness of university-industry relations, expanding on the university-industry role in country development. He mentioned that holding these symposiums and seminars helps improve this relationship, and we should pay more attention to our technicians and technology for advancement.

Then, Abrishami gave a talk on the elevator industry and the necessity of precise planning for accomplishments. He emphasized the support of training centers to develop education in this area. Finally, he analyzed the union strategy towards empowerment and skill growth in the industry and high safety in elevators nowadays.

Afterwards, Eng. Mahalei, director general of the engineering services office, declared technical training and guarantees in the elevator industry are crucial because of the importance of safety in this area.

After that, Dr. Hosseininahad presented his article on evaluating the performance and measuring the efficiency of the elevator to increase effectiveness. He investigated the failure rate and analyzed the matter by data envelopment analysis (DEA) method.

Then, Eng. Mozafarpour gave a speech on elevators resistant to earthquakes. He mentioned how earthquakes occur and the important factors of the design and manufacture of elevators resistant to earthquakes.

Next, Dr. Eskafi presented his article on design and manufacturing smart buffers. He explained buffer application in various industries and effective factors on their function. Also, he declared the usage of non-Newtonian fluids in these kinds of buffers.

After the break, Eng. Ebadi gave a presentation on his article on public elevator requirements. He investigated EN-81 standards and elevator protection from vandalism.

Next, Eng. Hasandoost gave a talk on her article about the usage of nylon in the elevator industry. She mentioned the usage of nylon in pulleys and its advantages for the environment, energy consumption decreases and lower costs.

Eng. Esmaeili followed and gave a talk on challenges in escalator use in public transportation. He expressed that choosing the escalator according to user type and technical details is really important, as well as its bill of materials (BOM).

Next, the expert panel on the investigation of the quality record of domestically manufactured parts in competition with imported parts and future strategies

Pishbin spoke during the seminar opening.

Eskafi was chosen as the best article presenter.

was held for the second time in Iran. Eng. Ememirad was the chairman of the panel, and the engineers and experts discussed the topic. Also, representatives of different parts, such as interior production, importation, standard and human resource management, were present for the panel. Its goal was to compare elevator parts production in Iran and elevator parts importation, as well as to analyze the business plan and economic feasibility.

According to the experts, Iran is strong in elevator parts production, scoring more than 80 out of 100 in this area. Also, domestically manufactured products are able to compete with European products since manufacturers have a high ability and capacity for production.

Afterward, Eng. Mardomi spoke about the elevator and escalator union activities and function and its achievements.

Sajadi spoke first and thanked the attendees, guests and sponsors for their presence.

At the seminar, qualified articles were presented in the convention hall with the instructors present. There were six articles on which the authors gave lectures. Twenty-two articles were sent to the seminar secretariat and 10 articles were accepted according to the scientific committee's judgment. Out of the 10 articles, six were presented at the convention hall.

At the end, commendation letters were bestowed to the foreign guest, elevator companies at the seminar, elevator and escalator industry experts and the presenter of the best article. Eskafi, head of the department of elevator and escalator engineering at Koosha College, was chosen as the best article presenter.

In this seminar, 13 elevator corporations participated as sponsors:

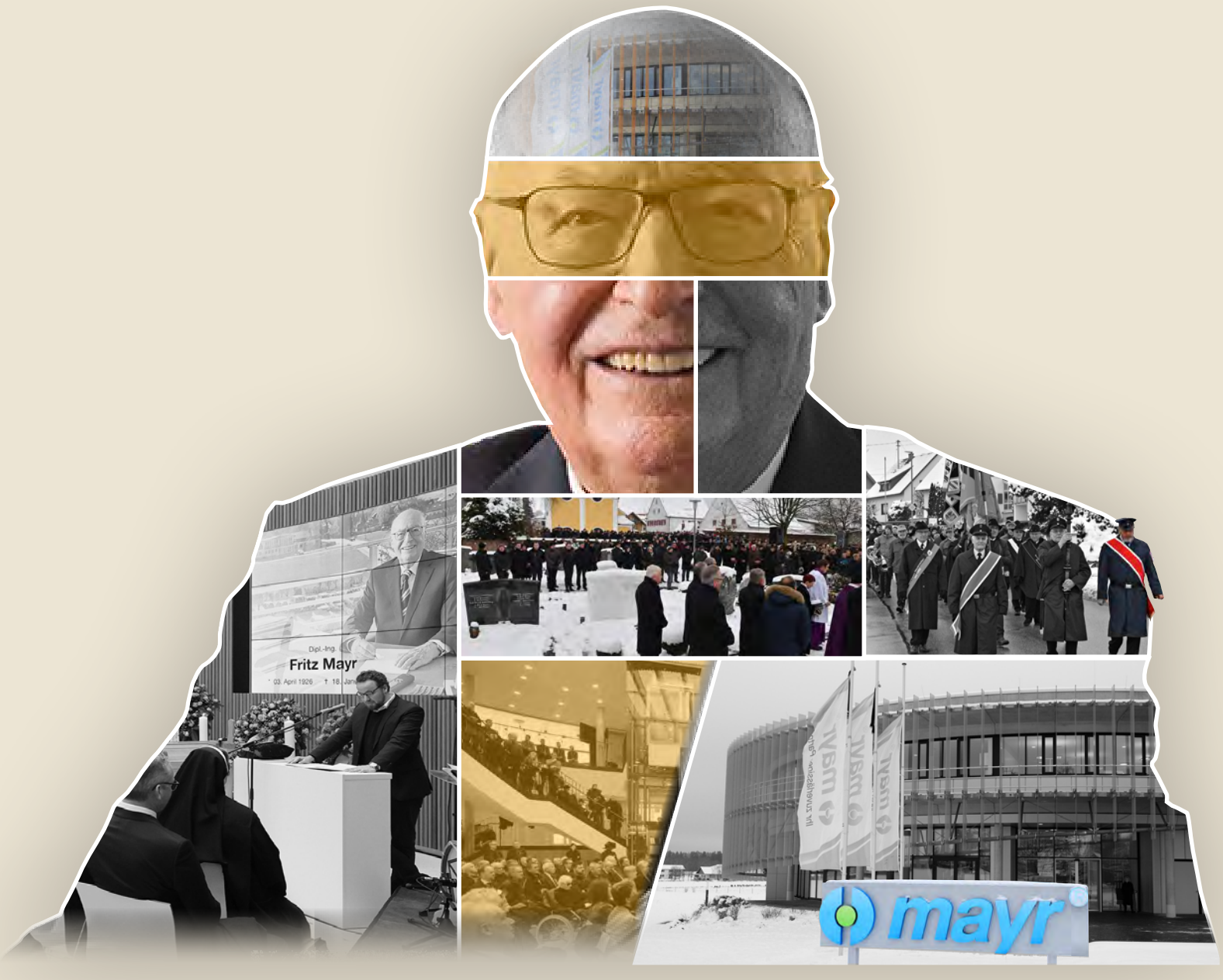
- General Cabin
- Cabin Plus
- Laran Sanat
- Hydro Farco
- NS Karen
- Saman Faraz
- Nikan Commercial
- Maleki Cabin
- Sana
- Balaban Sanat
- Elevator 110
- Tochal Asanbar
- Diara

Also, one significant international guest from Türkiye took part at the seminar: Mr. Bülent Yılmaz, managing director of ELEVATOR WORLD Türkiye and Middle East publications.

In conclusion, all participants are invited to the 13th International Seminar on Elevators and Escalators in February 2024.

A VERY SPECIAL MAN

Longtime mayr CEO Fritz Mayer passes away at age 96.



by Simone Dauer

At age 96 and after more than half a century as CEO of mayr® power transmission, Fritz Mayr passed away peacefully on January 18, 2023 surrounded by his nearest and dearest. The family business mourns the loss of its highly esteemed former boss. The female employee who assisted Mayr in his daily life said he always greeted her with a smile. "He certainly led a fulfilled life and lived to a proud age, yet I am deeply saddened," she said.

A colleague from the mayr technical office observed:

"Appointments with him were not always pleasant. But, more than once, while working on one of the new assignments he had given me, I wondered why I hadn't thought of it myself. I should have been the one to make the suggestion, to come up with the idea, being so much younger. But he, once again, had the bigger picture in mind and, perhaps without knowing it beforehand, recognized the latest trend. I am so grateful that I was able to learn so much from him."

Attendees listen to a mayr power transmission presentation; photo by Matthias Wild for mayr

Besides his enduring ability to generate ideas, Mayr is also remembered for showing respect to all company workers and promoting a family atmosphere that persists to this day. "Mr. Mayr never saw me as (just) a worker, but as a person — a person who succeeds together with him," a production worker said. That worker says Mayr not only influenced the global power transmission market, but also the personal development of employees such as himself.

Life Philosophy: Safety Does Not Allow for Compromises

Day after day, clutches, couplings and brakes from mayr power transmission in Mauerstetten, Germany, secure the movements in machines around the globe. This task allows zero compromise in quality. After all, safety brakes and clutches are components that must reliably ensure the protection and safety of people (and also material) in machines and systems. In other words, these components must precisely and instantly interrupt movements in an emergency, brake to a standstill or maintain specific positions with millimeter precision. In an emergency, these components can save lives. They thus stand for safety that does not tolerate compromise, and this was precisely Mayr's life philosophy. He once said:

Fritz Mayr at his desk; photo by Eddie Wölf for mayr

"Tradition and innovation are the supporting pillars which have guaranteed our stability for generations."

— former mayr CEO Fritz Mayr

The funeral procession; photo by Harald Langer for mayr

"Tradition and innovation are the supporting pillars which have guaranteed our stability for generations. In a world that is becoming increasingly fast-moving and uncertain, this means reliability and long-term security. Secure workplaces on the one hand – but, of course, our products – also stand for safety and reliability. So, in other words, the topic of safety shapes not only our thinking, but also our actions."

Well-wishers pay respects at Fritz Mayr's grave; photo by Harald Langer for mayr

Fritz Mayr: 1926-2023

Fritz Mayr was born on April 3, 1926. After his return to Germany from Russian captivity in 1947, he began studying mechanical engineering at the Technical University of Munich in 1948. He graduated in 1952 with a degree in engineering (Diplom-Ingenieur). After working as a young engineer at Württembergische Metallwarenfabrik, he joined the family business in Kaufbeuren in 1956, representing the third generation.

The company was founded at the end of the 19th century as a millwright's workshop. In the 1950s, it continued to produce components for the drive technology of the time such as flat belt pulleys. In the years directly following World War II, a new clientele emerged for the mayr company with the Gablonz (German-Czech craft) industry. Before the war, this industry was located in Gablonz in northern Bohemia and represented an important economic sector there. Core products were jewelry, accessories and decorative elements made of various materials such as glass, stone or base metals. The need for industrial components was substantial, as the majority of companies had to start from scratch in Germany.

The mayr company was able to help, and supplied companies with everything they needed: grinding wheels for cutting glass pieces, top and side piercing machines for the production of buttons, lever and screw presses with up to 10 mT of compression force, engraving balls and lamp pliers. But it was also during this time that the first pioneering innovations were developed. For example, Mayr, grandson of the company founder, who was already managing the company alongside his father at the time, automated the predominant hand-injection molding process.

A "Hidden Champion" in Germany's Allgäu Region

A breakthrough in power transmission technology provided the company with a decisive impetus during this period: the development of the torque limiter. Torque limitation solutions were already available on the market; however, they were not what Mayr envisioned in terms of a high-quality clutch. Torque limiters, which are common today, did not yet exist, and Mayr recognized his opportunity for his own, qualitatively superior solutions. By offering torque limiters for housing fans, Mayr made a successful debut in this field. EAS® torque limiters were launched in the market in 1963 and quickly became the

mayr headquarters in Maerstetten; photo by Matthias Wild for mayr

company's top-selling product. In 1965, Mayr officially took over management of the company from his father. Mayr was part of the management team until he passed away.

The company's premises in Kaufbeuren soon became too cramped due to the steady growth in the post-war period. The headquarters in Kaufbeuren, which the company had used since its foundation in 1897, had an area of only 1,400 m2. In 1972, the company finally moved to Mauerstetten, where it is still located today. Company premises cover an area of around 33,000 m^2 where more than 750 employees work.

mayr has been active on the international market since the 1960s. Representative offices and subsidiaries in more and more countries ensured the company's presence in different markets. Production also finally became international with the establishment of a plant in Poland in 1994 and another in China 10 years later. The company has repeatedly used its global presence to establish new branches for its technical innovations. In 1997, for example, the company ventured into the elevator market and, to date, has achieved market leadership in the area of elevator brakes.

Today, networking and digitalization are the big topics, including in the power transmission industry. mayr meets these challenges with innovative solutions. For example, electronic modules enable communication and control of safety brakes without additional sensors.

Focus on Stability

For Mayr, the most important element of the company's philosophy was stability. This principle has been a characteristic of the company from the very beginning and applies to all areas: From product development to delivery and service, to the innovations and, generally, the adaptability and consistency of the company. Jobs are also stable. Even in times of recession, the company has always been able to maintain all jobs and never had to lay off staff. Stability comes first. This guiding principle is also reflected in the foundation in 2015 of the holding company mayr Familien KG, which created a solid basis for future shareholder structure. During this process, Ferdinand Mayr, the grandson of Fritz Mayr, took over the company and in 2018 joined the Executive Board. In 2022, Ferdinand Mayr took over as CEO from Günther Klingler, who retired.

Stronger Together

The special thing about mayr power transmission is its orientation as a family-run company. Since its foundation, the Mayr family has backed the company. "We consider our company, with all its employees, to be a grown Mayr family," Ferdinand Mayr says. So, of course, many, especially long-time colleagues and companions of Fritz Mayr, are very sad about his passing and expressed their heartfelt sympathy at the death of the former CEO. A funeral took place on January 24.

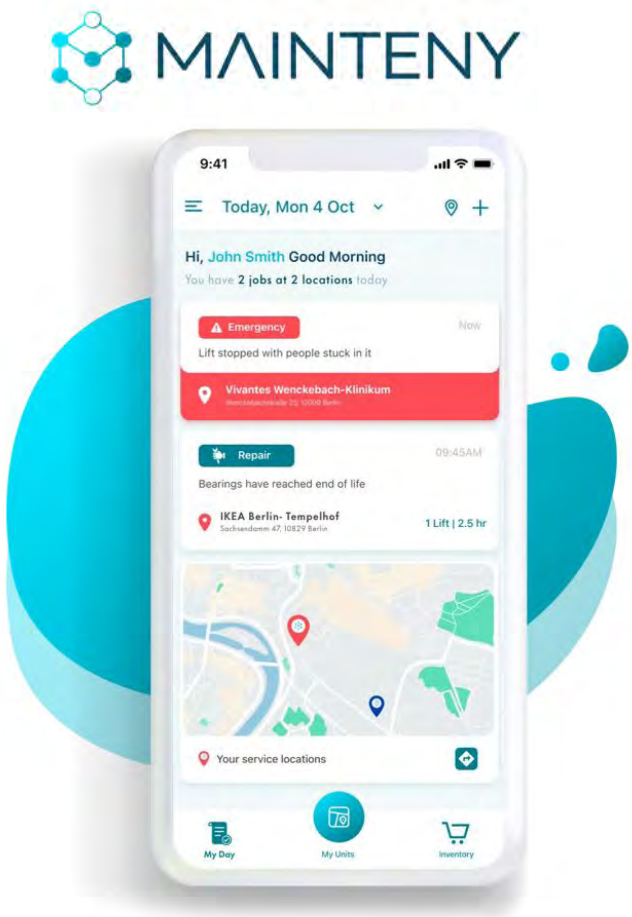
Simone Dauer is mayr press officer.

Elevator Maintenance Software

Mainteny, headquartered in Berlin, Germany, offers the Mainteny Product Suite for elevator maintenance companies. The company's software leverages technology to provide tools for everyday use to service technicians and managers. Mainteny solutions aim to remove administrative burdens, allowing elevator maintenance personnel to increase operational performance and focus on customer service. The product suite includes:

- **Mainteny App** — The "digital assistant" for service technicians, offering smart scheduling, routing, spare parts ordering, documentation and real-time facility status.
- **Mainteny Predictive Maintenance** — Connects to existing Internet of Things (IoT) devices and applies Machine Learning models, including all components, delivered at a single place and manufacturer-independent.
- **Mainteny Manager** — The unified application made for service managers with smart job assignments, real-time overviews of Units under Maintenance (UuM) and out-of-the-box enterprise resource planning (ERP) integrations.
- **Mainteny CX** — The "Customer Experience" application allows transparent, fast and real-time communication, boosting efficient customer interaction by 10 times.

mainteny.com



Germicidal Elevator Solution

uvDevelopment has engineered and patented an elevator island ceiling system, uvSafeLiteTM, that automatically cleans the air in approximately 1 min and surfaces in approximately 6 min with no labor. The integrated LED and Far UVC with 222 nm wavelength provides the equivalent of 200 ACH (air changes per hr) with only 96 W of energy consumed. A uvSafeLite prototype is installed in a building in the Back Bay area of Boston and available to view. An embedded computer with environmental sensors and intelligent algorithms continuously monitors and cleans the elevator to ensure safety. Integrated within the system is the patented Care222® Filtered Far UV lamp. The system is fully automatic and equipped with Internet of Things interface for remote monitoring and control. Cleaning parameters can be adapted for new and emerging threats and will adapt to regulatory standards. According to uDevelopment, uvSafeLite is "proven safe and effective for occupied spaces and against all biological pathogens."

uvDevelopment.com

POTS Replacement

The 4G WUR-LINK Cellular Bridge with a programmable wireless multi-size SIM, SIM activation card and enclosure is available from Wurtec. Replacing traditional plain old telephone service (POTS) lines, the cellular bridge eliminates the need for landlines by providing a cellular connection for an emergency phone. The cellular bridge provides an up to 50% reduction in phone bills, eliminates the hassle of coordinating installation with phone companies and has been fully tested for effective performance with the Wurtec S3C line of Americans with Disabilities Act-compliant emergency communications. WUR-LINK is:

- Preconfigured for fast and easy installation
- Housed in a commercial-strength enclosure
- Equipped with 10-h battery backup
- Capable of remote line monitoring
- Equipped with a dedicated line for an elevator phone
- Able to facilitate incoming and outgoing emergency calls
- Optional UL-listed for call center monitoring

Technical specs include:

- Telco output of 48.2V DC
- Voltage input of 13V DC
- Shipping weight of 2.32 lb
- 1800 mAh 7.2V battery
- Current draw of 110 mA when in use
- Voice-over LTE (VoLTE)
- T-Mobile network
- Compliance with A17.1 section 2.27
- RJ-11 jack connections

wurtec.com

Gearless Synchronous Lift Machine

The WSG-LF.S gearless synchronous lift machine is now available from Wittur. The WSG-LF.S is low-vibration and silent due to a matching magnet design. It is compliant with EN 81-20/50 and ASME A17.1. Features include:

- Rope tension in all directions
- Modular system allows for a lot of options
- Solid construction for permissible shaft loads at the traction sheave up to 22,500 lb
- Safety brake system with electro-magnetical release, manual release as an option, contacts for brake control, dust over for the brake air gap
- EC type-examination certificate according to EN 81-20/50, can be used for UCM solution
- Synchronous motor, 20-pole, with high-efficiency permanent magnets, insulation class 155 (F)
- Variable options regarding voltage, speed, torque, measuring system and traction sheave parameters

wittur.com

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SCHAEFER

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FOR FIXTURE, CABIN PANEL & CABIN ROOF / CEILING INSTALLATION

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More: **https://schaefer-products.com/hygiene**

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